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A SUMMARY OF INFORMATION ON *PINUS CONTORTA*
with special reference to its use in Europe

By

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1. NOMENCLATURE

Pinus contorta Doug. has been described in the past as comprising two varieties or, by some botanists, has even been divided into two separate species. These have been termed the Shore or Beach Pine, *P. contorta* Doug., and the Lodgepole or Murray Pine, *P. contorta* var. *latifolia* Engelm., which is synonymous with var. *murrayana* Engelm. and *Pinus murrayana* Balfour. In this country Dallimore and Jackson [18] and in the U.S.A. Rehder [94] have recognized the two varieties, but the most recent publication [70] notes that the differences are more in habit than in botanical characters. Experience in Britain indicates that there are wide differences in inherited characters, botanical and otherwise, but that the two extremes usually recognized under the above names are connected by intermediate forms, with no clear boundary.

In north-west America, where the Shore or Beach Pine is of little commercial value, the general name for the whole species is Lodgepole Pine, and in view of the difficulties in subdividing the species, the name 'Lodgepole Pine' = *Pinus contorta* is used in the same way in this paper. In certain cases where the form or variety of the tree is not known, but only the provenance of the seed, the terms 'coastal' and 'inland' will be used, the former referring to plants from seed collected within a distance of very roughly 100 miles from the sea coast of north-west America.

2. NATURAL RANGE

The range of Lodgepole Pine as a whole is very wide. The northern limit lies on the Yukon River (Klondyke district—64° N.), and it stretches southwards through the Cascade, Sierra Nevada and San Jacinto Mountains, through the provinces or states of Alaska, Yukon, British Columbia (including the islands), Alberta, Washington, Montana, Oregon, Idaho, Wyoming, South Dakota, California, Nevada, Utah and Colorado to New Mexico (Mason [76], also Sudworth [105] and Betts [11], who describe the distribution in detail). It is found from sea level up to 5000–6000 feet at the lower limits of the sub-alpine type in British Columbia [116] and up to the timber line at 11,500 feet in Colorado and southern Wyoming [76].

Within British Columbia the distribution of *Pinus contorta* is so general that Whitford and Craig do not draw distribution lines in their maps as they do for other coniferous species. According to Sudworth [105, pp. 51–2], "The so-called *P. contorta* (exclusive of var. *latifolia*) ranges from the coast and islands of Alaska southwards mainly in the immediate vicinity of the Pacific coast of British Columbia, Washington, Oregon and California to Point Avena, Mendocino county, and Casquet, Del Norte county". In this range it grows commonly from near sea level to about 500 feet elevation, but forms of it are reported in Washington and Oregon up to 3000 feet.

Halliday and Brown [51] state that the heaviest stands of Lodgepole occur in the rain shadow of the Rockies and coastal mountain ranges, i.e. in the cool dry northern interior of British Columbia and the high foothills of western Alberta. The eastern boundary does not extend further than 200 miles east of the Rockies, but there are more distant outliers of Lodgepole on the middle Hay and lower Peace rivers in northern Alberta and in the Cypress Hills of south-eastern Alberta and Saskatchewan. These outliers are probably relicts of the Ice Ages.

Bates [7] suggests that Lodgepole originated at a high northern latitude and only comparatively recently migrated to the U.S.A., because the germination of the seed is slower than that of Douglas Fir (*Pseudotsuga taxifolia*), Engelmann Spruce (*Picea engelmannii*) and Yellow Pine (*Pinus ponderosa*), and also because much of it fails to germinate until the second year after sowing.

Wood [119] describes the pioneer status of Lodgepole as a continental western American radiant, re-establishing the forest after the retreat of the ice, and a more recent expansion on muskeg sites in Alaska, quoting in this connexion the work of Hulton and many pollen analyses by Hanson.

East of its range, Lodgepole is replaced by Jack Pine, and in that part of Alberta where the Pines intermingle, hybrids are found [79]. The artificial cross, × *Pinus murraybanksiana*, is reported to show heterosis or hybrid vigour and to be 79% taller than Lodgepole [23; 96].

3. Form and Size

The extreme forms of Shore or Beach Pine and inland Lodgepole have been described as follows:— In British Columbia the Shore Pine "is found in swampy places, along the shores of the sea or lakes, or on exposed rocky places, where other species find the conditions too difficult to overcome. Growing thus, it develops a scrubby, knotty form and, except in a few situations, is of little commercial value" [116]. In California: "On the sand dunes and bluffs it is dwarfed, distorted or of irregular growth by reason of the exceedingly exposed situations which it occupies. The weave of its foliage and branchlets to windward is often remarkably close and uniform, making to leeward completely sheltered nests where the wayfarer may take refuge against the cold winds driving in from the Pacific Ocean. Such trees protect others of their kind further inland, some of the latter themselves attaining a height of 40 feet" [60]. It grows in a similar manner in western Vancouver Island and at 500–750 feet on the mountains on the mainland opposite the island [27, Vol. 5, p. 1135].

In contrast, the Lodgepole Pine is described thus by Mason [76]: "As a forest tree Lodgepole characteristically forms a straight, slim, gradually tapering trunk with a compact, conical crown. In very dense stands trees which have been crowded throughout life may have extremely narrow crowns with a spread of only 3 or 4 feet and occupying only from 10 to 20% of the stem length. In such cases the crown is usually irregular, and often appears as a mere bush at the top of the tree. In stands of moderate density the crown is still characteristically narrow, though more regular, and occupies from one-half to one-third of the stem length. Even in open-grown stands the crown seldom spreads more than from 16 to 20 feet, but the branches often come down nearly to the ground and the taper is usually rapid". Lodgepole normally attains a height of 50 to 75 feet and a diameter of 12 to 24 inches. In dense stands the trunk tapers very little and may be clear for over half its length [116]. Trees of 110 to 115 feet in height and 25 to 34 inches in diameter (6 to 9 feet girth) are recorded by these authors and by Mason [76]. Rehder [94] gives 160 feet as the limit.

Intermediate forms are described in Section 6 below.

The root systems of juvenile Lodgepole Pine and their mycorrhizae were studied by Preston [91; 92] and the root system of the mature tree by Gail and Long [39].

4. Factors of the Habitat

(*a*) *Climate*

The immense natural range of *Pinus contorta* as a whole, demonstrates its ability to grow under diverse climatic conditions.

The rainfall varies from about 15 inches per annum as in Alberta, east of the Rockies, or 18 inches in the warmer temperatures of Colorado, up to 100 inches or more near the coasts of Vancouver Island and Washington. In the Lodgepole areas of the U.S.A. the later summer is moderately or very dry, whereas in British Columbia the spring is the driest season. Snowfall is considerable and lies till late spring over the whole inland range.

Extreme temperatures vary from 100° to − 55° F., with mean monthly temperature ranging from 14° to 57° in the inland areas of British Columbia (e.g. Banff) or from 36° to 64° near the coast (e.g. New Washington). The mean annual temperatures at these two towns are 35·6° and 50°. Detailed climatic data, summarized in different ways, are given in [59], [113], [12], [76], [66] and [50].

(*b*) *Soil*

Reports on the soil requirements of *Pinus contorta* are somewhat conflicting. Whitford and Craig [116] state that it grows in swampy soils, also on sandy and rocky soils without humus. On the muskegs of south-east Alaska, it is the principal tree species [122]. Both Mason [76] and Tower, quoted by Bates [7; 9], state that Lodgepole in the U.S.A. likes siliceous soils, having invaded the granite and glacial soils, and often leaving Douglas Fir to hold the lava and limestone soils. However, Faulkner [37] gives examples of Lodgepole on both volcanic ash near Terrace, B.C., and limestone near Kananaskis, Alberta, where the soil pH value is 7·5 or even more. It grows on bare gravel on steep slopes and ridges [76] and does well even on soils that have been repeatedly impoverished by fire [Cunningham, quoted in 14]. Cheyney [14] considers that Lodgepole is not exacting in its soil requirements, and that the absence of competition on lighter soils is probably a large factor in its establishment.

Gail and Long [39] describe Lodgepole Pine on deep peat, Hopkinson [56] describes its growth on muskeg or semi-muskeg soils with a foot of peat over mineral soil, and Moss [80] states that "they (Lodgepole and Jack Pines) send their taplike roots deep into sandy or gravelly soils, making for success on apparently dry sites. On the other hand, they are rarely successful on the heavier and more impervious soils, partly because these soils are not readily penetrated by the taproot of the Pine and partly because Spruce and other competing trees, having shallow but efficient root systems, flourish on these sites".

5. ECOLOGICAL RELATIONSHIPS

Lodgepole Pine takes an important place in Weaver and Clements' classification of the forest types of North America [115]. It is cited as one of the important dominants in the Spruce/Pine association of the Boreal forest formation in the far north; in the Sierran and, following fires, also in the Petran association of the extensive Montane Forest formation, though here it is "typically the subclimax dominant of the burn subsere but it is so exclusive and permanent owing to repeated fires that it is conveniently considered along with the climax". Its name is not even mentioned, however, in the summary of the important trees of the floristically far richer Coast Forest formation [115, pp. 481–508]. Wood [119] states that in these moister associations *P. contorta* is of very minor importance and is practically confined to such refuges as muskegs, shorelines, etc. which have only one thing in common, namely, that they are too poor for anything else.

In British Columbia, Whitford and Craig [116] describe a Lodgepole Pine forest type only as an alternative name for the Engelmann Spruce/Alpine Fir (*Picea engelmannii*/*Abies lasiocarpa*) type of the interior plateaux and mountain regions, i.e. the interior dry belt. The Spruce and Fir are assumed to have composed 75% or more of the forest, but "the original forest has been so badly damaged by repeated fires that it has become extensively replaced by Lodgepole. . . . For other areas now covered with Lodgepole Pine, there is no historical evidence nor any indication in the present vegetation that the former forest cover was anything other than Lodgepole Pine. Such areas usually occupy sandy, pebbly or impoverished soils, in regions where the precipitation is light". In the interior Douglas Fir type, "Due to repeated fires, Douglas Fir has been replaced over large areas by Lodgepole Pine. So extensive has been the replacement that the Douglas Fir type, as a whole, gives the aspect of a permanent Lodgepole Pine type. . . .". At lower elevations, "Lodgepole Pine has frequently invaded burned-over areas of the Yellow Pine (*Pinus ponderosa*) type, but this does not occur so often in this type as in some others". At the highest elevations, in the open forest type above the level where merchantable timber is found, i.e. 5000–6000 feet in parts of southern B.C. and 3000–4000 feet in the north, "Lodgepole Pine occurs in many places throughout the area of the interior sub-alpine type, but only at the lower altitudinal limits of this type". Whitford and Craig further state that after the fires "On poorer soils, Lodgepole Pine, with Aspen (*Populus tremuloides*) and Western [Water] Birch (*Betula occidentalis* var. *occidentalis*) are the first invading species", and they make it clear to what a great extent Lodgepole is a successful colonizer of poor ground after fire. Wood [119] explains the very rapid growth of young Lodgepole, pointing out that in competition with other species, once it is established, it makes its full height growth on all kinds of sites, and will become suppressed and replaced by other species only after its rate of growth decreases.

Details of the ground flora in the Canadian Dry Belt stands of Lodgepole Pine are given by Ilvessalo [59]. Some typical ones are:—(*a*) *Pachistima* type—A mesophytic type characterized by two low evergreen shrubs, *Pachistima myrsinites* and *Berberis aquifolium*. The abundant and rich herbaceous vegetation includes grasses. The most important trees are *Pseudotsuga taxifolia*, *Pinus monticola*, and *Thuja plicata*; Lodgepole is a migrant from higher elevations after fire and there are few old trees. This type is described from Mt. Ida, near Salmon Arm of Shuswap Lake. Elevation 3000 feet. (*b*) *Calamagrostis* type—A drier type characterized by grasses. Herbs and dwarf shrubs occur, e.g. *Spiraea* spp. Lodgepole Pine, also Douglas Fir and Aspen, the Lodgepole usually invading the Douglas after fire. Described from Long Lake forest reserve, south of Kamloops. Elevation 4200 feet. (*c*) *Arctostaphylos* type—The most xerophytic, characterized by *Arctostaphylos uva-ursi* in places, and elsewhere by *Cladoniae* and *Peltidea.* Less rich than the above types. Lodgepole Pine and some *Picea engelmannii.* Described from Upper Hat Creek, south-west of Ashcroft. Elevation 5000 feet.

Seed from stands on all three of these types is to be found in a number of provenance experiments and forest crops in Britain and on the Continent (described below) and it is of interest to compare the vegetation in these with that of the parent forests.

A description of the occurrence of Lodgepole Pine in the Queen Charlotte Islands with general details of climatic and soil data is given by Hopkinson [56]. He reports that it grows in mixture with other species on muskeg or semi-muskeg soils, and on these poor sites it keeps up well with them and reaches about 50 feet in height and 6–9 inches in diameter. It does not often do so well in the Islands as on the mainland, and is not in its optimum site.

For northwestern Alberta, Moss [80] writes:—"As is well known, Jack and Lodgepole Pines are fire trees, commonly reproducing by seed following burning of stands. Since they are also light demanding, they succeed on burned areas because their early growth is much faster than that of any Spruce that may have started".

In the U.S.A., Lodgepole is found above dry and hot lower slopes bearing "such species as Juniper (*Juniperus scopulorum*) or Douglas Fir (*Pseudotsuga taxifolia*) which require less soil moisture than Lodgepole and are better constituted to resist transpiration. . . . At the upper limits of its range Lodgepole gives way to other and more tolerant trees. Increase in soil and atmospheric moisture encourages such species as Engelmann Spruce and Alpine Fir while the relatively short growing season at high elevations does not furnish the total amount of heat which Lodgepole needs for its growth [76]".

Larsen [67] describes the Douglas Fir/Lodgepole Pine forests of central Montana, the Pine being "abundant from 6000 to 8000 feet" and occupying dry, rocky slopes, the Douglas occurring "most commonly along canyon bottoms and places with considerable seepage". The Pine occupies the south to west aspects and the Fir the north and east slopes. The great abundance and wide distribution of the Lodgepole is due to extensive fires. *Abies lasiocarpa* is the climax species over most parts now occupied by the Douglas Fir/Lodgepole Pine type.

"In relation to light, Lodgepole Pine exhibits three striking characteristics—intolerance of any considerable degree of overhead shade; ability to survive for long periods in a badly crowded or suppressed condition in pure, even-aged stands; and ability to recover and make increased growth after being released from suppression. . . . Some stands over 50 years old have more than 50,000 live trees per acre from 8 to 10 feet high. . . . The wonderful persistence of the individual is shown by the loss of only 45% in numbers after 70 years of crowding" [76]. Clements [16] found that under a dense stand (light value 5–12% of full sunlight) there were no seedlings, but that they established themselves in 20% of full sunlight [quoted in 14]. In the list quoted by Weaver and Clements [115, p. 405], Lodgepole Pine is ranked as one of the most intolerant of all coniferous species. Bates [7] states that Lodgepole needs exposed mineral soil for natural regeneration, and cannot invade some limestone, lava and alluvial soils, which is explained by its much higher wilting coefficient, 22% as compared with Douglas Fir 12 and Engelmann Spruce 16%.

It is reported to suffer from drought on dry soils by Bates [7; 8], who found Lodgepole to have a water requirement second only to Limber Pine (*P. flexilis*) and greater than *P. ponderosa*, *P. aristata*, *Pseudotsuga taxifolia* and *Picea engelmannii*, and this was confirmed by Roeser [99], who found that the transpiration rate of Lodgepole was higher than that of Western Yellow Pine and Douglas Fir (least) and Engelmann Spruce (intermediate).

Gail and Long [39] studied the occurrence of Lodgepole in western Montana, Wyoming and Idaho and noted that it occurs in hollows, gulches and on north and east slopes (cf. Larsen, quoted above), all areas protected from the prevailing wind, and that the soil in all these places is "underlaid by a 'false hard pan' formed by the deposition of colloidal material leached from the surface soil. This hard pan is so resistant to roots as to greatly distort them. It is not impervious to water but owing to its highly colloidal nature has a high water-holding capacity, which results in the raising of the level of the water table". The presence of Lodgepole Pine in one exposed area was related to heavy snowfall and summer showers, the desiccating effect of the wind thus being reduced. In pot experiments to elucidate the reasons for this restriction of Lodgepole to sheltered sites, these investigators found that in comparison with *P. ponderosa*, it has a shallower root system with less extensive lateral development and the plants have a greater water loss when exposed to steady wind, whether computed on dry weight, fresh weight, or transpiring area of needles.

Rigg and Harrar [95], investigating the root form of trees growing on sphagnum bogs, which they note are less susceptible to windblow than trees on harder soils, found that *Pinus contorta* is distinctive among all the species examined in that it develops a tap root. Its vertical penetration is extremely small in waterlogged soil, but well developed, relatively speaking, on glacial till.

It is clear that many of the above reports conflict with one another, and considering the range of climate and other habitat factors under which *Pinus contorta* grows, it must be concluded that it is a most adaptable species, reacting in many different ways to the factors of the locality where it grows. When transferred to Europe, it may be expected to react in a similarly variable manner, with the provenances doing so on a lesser scale.

6. EARLY DEVELOPMENT OF THE DIFFERENT VARIETIES OR PROVENANCES OF *PINUS CONTORTA*

The characteristics upon which the differentiation of the species into two varieties has been made may be summarized as follows:—

Authority	*Pinus contorta* proper	*P. contorta* var. *latifolia*
Rehder [94].	Tree to 10m. (33 ft.).	Slenderer pyramidal tree to 25 m. (82 ft.) or occasionally 50 m. (160 ft.).
	Needles 3–5 cm. (1¼–2 in.), dark green.	Needles 3·5–8 cm. (2–3 in.), lighter green. Cones less oblique.
Canada [13].	Bark ¾–1 in. (2–2½ cm.) thick, deeply furrowed and covered with reddish-brown scales.	Very thin, orange-brown to grey, slightly scaly.
	Needles 1–1½ in. (2½–4 cm.) long, dark green.	Needles 1–3 in. (2½–8 cm.) long, yellow-green.
	Cones ¾–2 in. (2–5 cm.) long, light yellow-brown.	Cones 1–2 in. (2½–5 cm.) long, yellow-brown, often borne in clusters.
Sudworth [105].	Bark "deep purplish red-brown and has deep, rough furrows and ridges which are sharply cross-checked"; young poles and the crown branches and stems of old trees have "thin, smooth, fine scaly, pale brown bark, with a greyish tinge".	'Thin, smooth, fine scaly, pale brown bark, with a greyish tinge', over the whole tree.
	Needles "dark yellow-green" and "only about one-third as thick as those of the inland and eastern representative".	Needles "bright yellow-green" and "nearly an eighth of an inch (3 mm.) wide".

It may be noted, however, that Sudworth concluded by considering *P. contorta* to be one polymorphous species. Similarly, Whitford and Craig [116], describing the British Columbia forests, maintained that the botanical distinction between the varieties breaks down in practice, though they did make reference to 'coastal type'. Davidson and Abercrombie [19] regarded the so-called variety "as nothing more than an environmental *form*", quoting two young trees of the two varieties as being "identical in foliage, habit, and rate of growth" when planted side by side.

Experiments to investigate this matter have been carried out in many countries, from which it appears likely that the species *P. contorta* comprises a number of ecotypes probably forming one or more clines. It may be that when more information is available these will be separable into several defined races. In the meantime, differences are best defined by the use of the term 'provenance', plants of different provenance being considered separately until their affinities have been worked out experimentally. This is in agreement with the opinion of the International Union of Forest Research Organizations on the subject [47].

(*a*) *In the U.S.A.:* Comparative experiments on Lodgepole seed of different provenances were made in the U.S.A. by Haasis and Thrupp [49]. The seed was collected in 1927 from Shuswap Lake, Mt. Ida, Highland Valley, Long Lake, Barnes Creek and Upper Hat Creek, all localities east and west of Kamloops, ranging in altitude from 1200 to 5000 ft. and within 30 minutes of latitude. Ilvessalo [59] described these experiments in detail. Germination tests at seven temperatures (between 15° and 41°C.) suggest "that for a given species, seeds produced in colder climates may be expected to germinate more quickly at rather lower temperatures than those from warmer climates and *vice versa*". Seed from the higher elevations germinated much better at the lower temperature of 19° C., while at the higher temperature of 41°, seed from the lowest elevations gave the best result. Below 19° results were not entirely consistent [49].

Plantation experiments at the Rocky Mountain Forest Experiment Station in Colorado indicate that, in general, seed from the nearest seed source gives the best growth results, though the extent of variation within a seed progeny largely eliminates the significance of the group performance. In Wyoming also "the relative survival and performance have been increased in ratio to proximity of the seed source to the experimental area" [104]; cf. also Roeser [98] and Bates [9].

(*b*) *In Europe*: The earliest experiments were carried out in Finland, where A. F. Tigerstedt [108; 109] reported on the very successful results and good growth of Lodgepole in the arboretum at Mustila. He noted that the true Shore Pine (thought to be of Washington origin) had all died, and the growth of a N.W. Canadian provenance (Banff, Alberta) was better than that from Montana, U.S.A.; also that the Lodgepole grows well on both good and poor soils, though he records a peculiar root system unable to penetrate unweathered clay as successfully as does Scots Pine. The dense needle fall gives a deep litter layer which, he stated, indicates favourable possibilities for soil improvement. C. G. Tigerstedt [110] described the Mustila results in more detail. It is hardly surprising that after these reports, interest on the Continent centred on the inland Lodgepole Pine.

Another experiment with two Alberta provenances (Calgary and Olds) was started in Finland in 1927, but the differences between them were small [61, p. 261].

A third extensive experiment was started in 1928 with plantings in 1931 at Punkaharju and Ruotsinkylä. It contained 8 provenances from the interior dry belt, mainly in B.C., including those tested in Haasis and Thrupp's experiment on the seed, reported above. Kalela [61, pp. 261–4] gives the results and states that at Punkaharju the failures in the two warm-climate provenances (Salmon Arm and Mt. Ida) were very high, but at Ruotsinkylä the winters are significantly milder and the Mt. Ida provenance proved about as hardy as the cold-climate provenances. At Ruotsinkylä the fastest growing provenances are those of the warm climates. The exceptionally good growth of the Trout Lake provenance is probably due to a better site for this plot. At Punkaharju the growth of the warmest-climate provenance had obviously been severely retarded, but that of the remainder corresponded with their growth at Ruotsinkylä. The number of years in which the leading shoot had been killed was recorded at both places, this being relatively less for the colder and more continental provenances. The Salmon Arm and Mount Ida provenances are definitely more crooked than the others.

Seed of four of the same provenances tested by Haasis and Thrupp was also planted at Vallombrosa Forest, Florence, Italy [87, pp. 321–5]. As was to be expected in a warmer climate, the warm-climate provenances did best, the high-elevation Hat Creek plants being appreciably slower in growth.

These four provenances were included with others, both coastal and inland, planted at the same time at many sites in Bavaria. To the first report by Fabricius [29], Kalela [61, pp. 258–60] added climatic data and re-arranged the data in decreasing order of temperature at the planting site. This order is the same, whether judged by number of months with mean temperature of or over 10° C. or by mean temperature of the warmest month of the year and (as might perhaps be expected in an area as homogeneous as Bavaria) the order is practically the same for the other temperature data. It so happens that the elevation and rainfall vary together, and approximately inversely to the temperature data. Although the plants were only four years planted when measured, the results indicate some regular trends. Plants from the higher elevations with cooler climates and fewer frost-free days are taller at higher-elevation experiments, this being true at six of the seven sites at 595 m. and over; coastal provenances grow better at four of the six experimental sites at 400 m. and below; finally the intermediate-elevation Kamloops provenance grows best at two of the three sites between 400 and 595 m. While these experiments are far from conclusive, they tend to show that the greater growth is obtained from provenances whose climate of origin is related to that of the site. Fabricius also notes that the coastal provenances have needles of a more blue-green colour and they are coarser, broader and somewhat more twisted than the inland provenances.

A further report on this series of experiments has been published by Rohmeder and Meyer [100]. It confirms the tolerance of Lodgepole to many types of soils other than calcareous or highly alkaline ones. In view of usage in Britain it is of interest to note that no provenances were successfully established on deep peat (*Hochmoor*) either on the natural moor or after peat cutting and manuring with ash. These authors also lay stress on the damage done by snow to the coastal provenances by reason of their wider and more spreading crowns. All provenances are of coarse growth and failed to clean themselves readily of dead branches.

Related provenances were planted simultaneously near Freiburg in the Black Forest for comparison with the Bavarian experiments, and they gave somewhat similar results except that Lodgepole was more resistant to snowbreak than native Scots Pine [44].

In Sweden, Langlet [64; 65] published the results of a small experiment with a few plants (14 to 21) of each of three provenances (Ocean Beach, Washington; Summer Lake, Oregon; Klamath County, Oregon). At the age of five years the mean height of all the plants, the mean of the tallest plants and the mean length of the needles, were greater for the coastal and less for the inland provenances. When transplanted, the coastal provenance was found to have a smaller root system than the two inland ones. Langlet also gives data showing a negative correlation between the dry weight of the seedlings, expressed as a percentage of their fresh weight, and the size of the plants at the age of five years.

In France, in an experiment started in 1934, provenances from the Canadian Rocky and Californian mountains established themselves well and the rapidity of their growth is excellent in Brittany, the Massif Central, the central plains and in Lorraine, as also in the dry calcareous soils of the Domaine des Barres. The coastal form is said to be very slow growing, but it is not stated whether it was included in these provenance experiments or not [90].

In the maritime climate of the west of Europe, the relative importance of the coastal provenances of *Pinus contorta* is much greater. In Ireland, marked differences between the coastal and inland provenances were recognized as early as 1928. Forbes [31], after discussing the nomenclature problem, referred to them as *Pinus contorta* and *Pinus murrayana*. The coastal Pine grows more rapidly in Ireland, its branches are larger and its crown is denser. Forbes notes that its needles are larger, more slender and darker green. Except for the statement about the length of needles, these observations have been borne out by many workers reported below. For Northern Ireland, Redmond [93] summed up the position thus:—"*Lodgepole Pine:* This form suffers somewhat less from (climatic) defoliation than Scots Pine, but is more sensitive to wind. On the most exposed sites, so many branches are killed as to make the formation of canopy impossible. Where conditions are less severe, growth is slightly more rapid than for vigorous Scots Pine". "*Shore Pine:* This race is approximately twice as rapid in height growth as the other. It forms a dense canopy very rapidly under the worst conditions, not only of soil but of altitude and exposure, hardly ever suffering the death of even a few twigs. Its form has proved to be excellent when growing on the poor shallow soils to which it is especially adapted —although, admittedly, on the better sites there is a strong tendency to coarseness. This indicates fertility sufficient to support a more exacting species whose growth habit is above suspicion, usually either Sitka Spruce or *Abies procera*".

Gibson [41] confirms the above report on the good growth of the coastal variety, considering it "of considerable value for planting either in mixtures or as a pioneer crop on a wide range of poor soils". Lodgepole "has little advantage over Scots Pine on exposed sites where it appears to suffer equally severely from needle-cast".

As on the Continent, the earliest experiments in Britain were carried out with inland Lodgepole. A few plots were planted in 1928, and the same four provenances tested by Haasis and Thrupp and grown in a number of European countries, as described above, were planted in several forests in 1930 and 1931. These ranged from Culbin and Roseisle forests in the relatively mild climate of the Morayshire coast of north-east Scotland, through Teindland, more elevated and further inland, to an elevated north-facing slope at 1400 ft. in Clashindarroch forest, Aberdeenshire. At the latter site, there were many failures in all lots except that from Upper Hat Creek, the highest locality in B.C. In the more favourable forests there was little difference between the provenances at first, but now the warmer-climate Long Lake and still more favourable Mt. Ida provenances are showing a very slight advantage in rate of growth [37].

Other more comprehensive experiments have been started in the forests of Clocaenog, Denbigh; Clashindarroch, Aberdeenshire; Teindland, Morayshire (1934–38); Achnashellach, Wester Ross (1937–41); a closely comparable pair at Millbuie, Easter Ross and Allerston (Wykeham), E. Yorkshire, in 1938; and also at Kirroughtree, Kirkcudbrightshire (1939–41). The results indicate that, in general, "of the two regional strains of this tree, the coastal form is the more vigorous . . . though not as straight-growing, as the inland type" [35]. A description of the two types to be seen at Clocaenog, noting the advantages of the coastal form as a pioneer or nurse crop, able to suppress heather quickly, and contrasted with the better form as a timber tree of the inland Lodgepole Pine from Kamloops, B.C., is given by Wood [118]. More detail of this experiment is furnished by Edwards and Pinchin [26] who show that other characteristics of the coastal type are the greater number of branches per whorl, thicker branches, a wider crown and a markedly shorter needle. Further evidence, from a wide collection of provenances, is given by Macdonald [75]. He also notes that the coastal type retains its needles on the branches for a greater number of years, and that the needles are a darker green than those of inland types.

From the point of view of good form and appearance, the most extreme inland form so far introduced, from Alberta, has done well, both in experiments on peat [124, p. 40] and in Scottish forests, where it has frequently been described with approval. However, there have been indications that these inland forms may in certain places suffer from die-back, frost damage, and subsequent attacks by fungi [20; 75; 37].

There is some reason to hope that the poor form and appearance of some provenances of coastal type may improve with age. In one of the oldest crops of coastal Lodgepole Pine in Scotland (31 years, at Culbin forest, Morayshire), photographs show a marked contrast between its present state and its poor youthful appearance.

The British provenance experiments do not always reveal a clear differentiation into two types, and there are intermediate forms. So also O'Kelly [84] referred not only to the Shore and Lodgepole Pines but also differentiated between a sub-erect branching type and a spreading branching type of var. *murrayana*. Many authors have not always been precise, but clearly in many cases they had only one sample of uncertain provenance to deal with. The true Shore Pine was originally described from sandy coastal areas in the southern part of the entire range of *Pinus contorta*. But in Vancouver Island, for example, Heiberg [52] reported that there were many places on sandy soil where there were good stands of Lodgepole Pine fully comparable with much that he found inland. Here and there in Alaska he saw coastal Pine of good form, with straight stems and fine height growth. The same has been reported by Wood [119].

In sum, it may be said that *Pinus contorta* is a polymorphic species, differentiated into ecotypes which form an ecocline ranging from the coastal Shore Pine to the most continental form of Lodgepole growing east of the Rocky Mountains, and distributed between 64° and 36° N. latitudes. It is reasonable to suppose that provenances that will succeed in Britain will vary from those from the coastal regions of B.C. or perhaps U.S.A., for the west of the country, to more inland provenances for use in the drier eastern areas and higher elevations. It is clear that a provenance with coastal affinities but yet of good form, as is apparently to be found in some parts of B.C., e.g. Vancouver Island or in the mainland on the Skeena river (e.g. Terrace, Hazelton) is an urgent need. Provenances from the latter region are growing in certain British experiments, but the former does not appear to have been introduced.

Part II and bibliography will appear in the next number.

ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

TRANSLATIONS

See Nos. 3953, 4002, 4049, 4061, 4084, 4124, 4126, 4282–3, 4288, 4293.

0 (02). HANDBOOKS. MANUALS. TEXTBOOKS

3167. CHAMPION, H. G. **Forestry.** *Home University Library*, Oxford University Press. No. 226, 1954. pp. vii + 230. 82 refs. Price 6*s*.

Designed to give a comprehensive but simple survey of the subject to the layman who wishes to obtain a clearer idea of the part forests and forestry play in the general picture of human activities and welfare.

0 (048.1). BIBLIOGRAPHICAL LISTS

See Nos. 3213, 3364, 3418, 3654, 3686, 3725, 4001, 4310, 4331.

0 (05). PERIODICALS. YEARBOOKS. DIRECTORIES. ALMANACS, CALENDARS, DIARIES

See also Nos. 3240, 3282.

3168. ***Annali de l'Accademia Italiana di Scienze Forestali.*** Accademia Italiana di Scienze Forestali, Florence. Vol. 1, 1953. pp. 466. [It.f.] Price [£3. 18*s*. 6*d*.]

Abbreviation in *For. Abstr.*: *Ann. Accad. ital. Sci. for.* This first volume published by the recently founded Forest Academy [cf. *For. Abstr.* 13 (p. 460)] contains the following articles, of which most have been published previously. Some are noticed elsewhere in this issue of *For. Abstr.*: The wood industry of the Sila (*F. C. Palazzo*); The soils in the neighbourhood of Bolsena with particular reference to the wooded zones (*F. Mancini*) [cf. *For. Abstr.* 14 (No. 2988)]; The forest code before and after the law of 1877 (*R. Trifone*) [cf. *For. Abstr.* 14 (No. 901)]; Mountain catchments (*A. Camaito*); The stabilization of river-beds: a central problem in the management of mountain catchments (*L. Zoli*); Density of *Eucalyptus rostrata* wood from the Agro Pontino (*L. Susmel*); Historical and economic vicissitudes of the forest of Cansiglio (*S. Muzzi*); The contribution of the state and of corporations to management of mountain catchments and the extension and improvement of mountain pastures and woods from 1867 to 1950 (*G. Patrone*); The forest economy of Tuscany (*V. Bellucci*); and The effect on Italian forests of the persistent drought of the last decade (*C. Sibilia*).

3169. ***Journal of the West African Institute for Oil Palm Research.*** West African Institute for Oil Palm Research, nr. Benin City, Nigeria, and Crown Agents for Oversea Governments and Administrations, London. Irregular. Price 2*s*. 6*d*. per copy.

Vol. 1, No. 1, for Sept. 1953 contains 100 pages. Abbreviation in *For. Abstr.*: *J. W. Afr. Inst. Oil Palm Res.*

3170. ***Forest Research Notes Causapscal Forest Research Station.*** Causapscal Station P.O., Quebec.

A series of research notes, to be issued from time to time, to describe or summarize the results of research at this station, which is run by the New Brunswick International Paper Co. Nos. 1, 2 and 3 are noticed in this issue of *For. Abstr.* (Nos. 3616, 3660–1). Abbreviation in *For. Abstr.*: *For. Res. Note Causapscal For. Res. Sta.*

3171. ***Boletín de la Facultad de Ingeniería Forestal.*** Universidad de Los Andes, Merida, Venezuela. Periodicity and price not given.

A new publication put out by the Forestry Faculty of the University of the Andes, with the object of disseminating information, and publishing the results of research. Vol. 1 No. 1 contains (1) an article on seed treatment [see *For. Abstr.* 15 (No. 3458)], and (2) a brief general comment on soil conservation introducing a series of articles dealing specifically with the Venezuelan situation. Abbreviation in *For. Abstr.*: *Bol. Ingen. for. Univ. Los Andes.*

0 (084.3/4). MAPS AND ATLASES

3172. Weltforstatlas. **[World forestry atlas** [part].] Fritz Haller Verlag, Berlin. 1953. [G.E.F.Span.]

[Cf. *For. Abstr.* 15 (No. 2184)]. Further map sheets, as follows:—Soviet Russia (forest distribution—northern and southern sheets; scale 1:3,300,000); Indonesia (forest distribution; 1:5,000,000); Java (land-use; distribution of important types of forest; both 1:1,500,000).

0 - - 011. TERMINOLOGY. NOMENCLATURE

See also Nos. 3283, 3289–90, 3299, 3317–8, 3379–80, 3978, 3991, 3994, 4060.

3173. S., J.F. **[Draft for official Japanese forest terminology.]** *J. Jap. For. Soc.* 35 (11), 1953 (370–6). [Jap.]

[Cf. *For. Abstr.* 15 (No. 2185).] Gives Chinese and Kana scripts with romaji equivalents; no definitions.

3174. Vahid, S. A. **A glossary of forestry terms: English – Urdu.** *Pakistan For. Mem.* No. 1, 1953. pp. 73. Price *Rs.* 4.*as.* 3.

0 - - 014. CLASSIFICATION

3175. **The Oxford system of decimal classification for forestry. Authorized English version.** Commonwealth Agricultural Bureaux, Farnham Royal, England. 1954. pp. 115. Price 10*s.* (interleaved 12*s.* 6*d.*).

Includes, in addition to the classification itself, an introduction explaining its application, an alphabetical index to domestic subdivisions of 145.7 (Insecta) used at Oxford, and a full alphabetical index of subject and of geographical numbers (39 pp.).

1. FACTORS OF THE ENVIRONMENT. BIOLOGY

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

3176. Hartmann, F. Die Forstökologie als Wegweiser für die forstliche Standortsbeurteilung. **["Forest ecology" as a guide to the determination of forest site types.]** *Schweiz. Z. Forstw.* 105 (3/4), 1954 (184–201). [G.g.f.]

An exposition by the author of his theories [cf. *For. Abstr.* 14 (No. 1867)].

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.2. Radiation and Temperature

3177. Fairbairn, W. A. **Preliminary light-intensity study under Sessile and Pedunculate Oak.** *Forestry* 27 (1), 1954 (1–6 + 4 photos). 4 refs.

The use of electric-cell photometers is described and the results given of measurements made under comparable stands of Sessile and Pedunculate Oak, which confirmed the belief that the former casts the heavier shade.

111.5. Wind

3178. Zentgraf, E., and Eisenkolb, R. Untersuchungen über den Verlauf schwacher Luftbewegung in freistehenden Beständen. **[Studies of the movement of weak air currents in stands surrounded by open ground.]** *Allg. Forst- u. Jagdztg.* 123 (7), 1952 (186–90). 9 refs. [G.g.]

Soap bubbles timed with a stop-watch were used to study the speed and direction of air currents in 6 deciduous stands (area 4·1-8 ha., in various W. German localities ranging from 255 to 505 m. in altitude). The measurements, made in late summer and autumn, 1951, registered air movements 10 to 15 m. outside the stands as well as in their interior, the chief object being to examine the effects of varying development of underwood and 'forest wall' (vertical curtain of foliage at the stand margin). Selected results are tabulated; they show that both underwood and 'wall' exert an appreciable braking effect upon air movement, supplementing each other so that a good 'wall' with poor undergrowth, or good undergrowth with a poor 'wall', are less effective than a good development of both. Under favourable conditions, the air in the middle of the stand may be quite still with wind speeds in the open of up to 1·5 m./sec. on the windward side. Despite stillness or much reduced wind speeds in the middle of the stand, however, an acceleration was noted towards the leeward margin; this is ascribed to a suction effect exerted by the air flowing over the canopy and sinking as it leaves the leeward margin. In some cases, but only on summer days, air was observed to flow from all sides towards the middle of the stand, regardless of the general wind direction in the open. Though the present data offer no explanation, this may be explained by Geiger's statement that the highest midday temperatures occur in and above the canopy. It is concluded that the forester, by favouring development of a good 'wall' and a several-storeyed stand structure, has it in his power to reduce or perhaps eliminate the often overlooked ill effects of "draughts" in forest stands.

111.7. Humidity, Evaporation. Precipitation

See also Nos. 3832, 3834.

3179. Rossmann, F. Das Rauchen der Wälder nach Regen und die Unterscheidung von Wasserdampf und Wasserrauch. **[The "steaming" of forests after rain and the distinction between forms of atmospheric water.]** *Wetter und Leben, Wien* 4 (3/4), 1952 (56–7). [G.) L.M.O.

The small transitory clouds or tattered mist formed above closed forest after the cessation of 1 or more hours' rain, especially in the mountains, are explained as the result of an air exchange between (*a*) the interior of the canopy and (*b*) the region immediately above the crowns. During the rain (*a*) is perhaps ca. 1° warmer [no measurements quoted] than (*b*). As soon as the rain stops, air from (*a*) rises and mixes with (*b*); the consequent cooling gives rise to temporary condensation, which disappears as the temperature becomes uniform. The scientific use of the term *Wasserdampf* ["water vapour", "steam"] applies to the vapour phase in the strict sense, and a word is needed for visible "steam", whether transitory or forming fog and clouds. For German, the author suggests (*Wasser-*)*Rauch* as an appropriate term.

3180. Robinson, P., and Glover, J. **The reliability of rainfall within the growing season.** *E. Afr. agric. J.* 19 (3), 1954 (137–9).

An extension of a former article [*For. Abstr.* 15 (No. 1030)] shows how to calculate the probability of the occurrence of (1) a desired amount of rainfall in any individual month, and (2) a desired pattern of rainfall for a period of months, e.g. growing season. For (1) the difference of (*a*) the mean rainfall of the month and (*b*) the rainfall desired in that month is divided by the standard deviation of (*a*) to give the "standardized difference", from which the % probability is read from a table. For (*b*) these % probabilities for each month of the period are multiplied together.

3181. Robinson, P. **[Rainfall reliability maps.]** *Rep. E. Afr. Agric. For. Res. Organ. 1953*, [1954] (64–5).

Maps presenting the probability of receiving at least 20 or 30 in. total annual rainfall have been prepared for parts of East Africa. In the Kenya Highlands areas not receiving 30 in. in more than 1 in 3 years are confined to ranching, and the success of arable farming therefore appears to depend on the assurance of at least 30 in. annually. High reliability, particularly of total seasonal rainfall, coincides in Tanganyika with high population density.

111.8. Climatology. Climate and Microclimate

See also Nos. 3177–81, 3389, 3578, 3832–6, 3894, 3913–4.

3182. Aulitzky, H. Forstmeteorologische Untersuchungen an der Wald- und Baumgrenze in den Zentralalpen. **[Forest meteorological investigations at the timber-line and tree limit in the central Alps.]** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Wien* 4*B*, 1953 (294–310). 13 refs. [G.] L.S.

Measurements were taken at various points at the timber-line and tree limit, both in the open and in the stand at altitudes of 1400–1900 m. about 10 km. S.W. of Innsbruck. Data are presented on air temperatures, air humidity and evaporation. In spite of greater insolation and higher wind velocities due to the altitude and the more open character of the stands, the climate within the stands was much more temperate than in the open, unless extreme conditions prevailed, in which case it became more rapidly approximated to conditions outside the stand than is usual at lower altitudes. The influence of external conditions depended also on exposure. The influence of the vegetation on microclimate was illustrated by the results of evaporation measurements, which showed a definite "mosaic" pattern of microclimate related to species and stocking.

114. *Soil. Soil Science*

3183. Wilde, S. A., Voigt, G. K., and Pierce, R. S. **The relationship of soils and forest growth in the Algoma district of Ontario, Canada.** *J. Soil Sci.* 5 (1), 1954 (22–38 + 1 plate). 25 refs.

Composition and site index of forest stands were determined on 2-acre plots by means of customary mensuration techniques. Particular attention was paid to quantitative analyses of ground-cover vegetation using a chain transect method. Soil profile studies and laboratory analyses of samples were supplemented in hydromorphic soils by ground-water analyses [cf. next abstract]. The Algoma region is strongly influenced by two types of plant succession: (1) the general succession caused by the geological youthfulness of the area, and (2) the local succession caused by fires and biotic activities, and reflected in the general tendency of the displaced climax forest to regain its lost ground. It is not uncommon therefore to find an essentially similar substratum occupied by 2 or sometimes 3 phases of the same successional catena. Seven broadly defined forest units are distinguished that are in the key positions of different catenas and characterized by more or less complete successional cycles. These are described.

114.1. Soil Physics

See also Nos. 3203, 3887–90, 3892, 3914.

3184. Pierce, R. S. **Oxidation-reduction potential and specific conductance of ground water: their influence on natural forest distribution.** *Proc. Soil Sci. Soc. Amer.* 17 (1), 1953 (61–5). 14 refs. L.S.

The mineral content of groundwater and its degree of stagnation are closely correlated with specific conductance and oxidation-reduction potential. To eliminate several handicaps involved in sampling and transport of uncontaminated water samples, a method of direct electrometric analysis of groundwater *in situ* was devised. The assembled portable equipment is described. Analyses of groundwater in lowland and peat soils of Wisconsin and Ontario have shown definite relationships between the properties of groundwater and the natural distribution of forest stands. [Cf. preceding abstract.] *From author's summary.*

3185. Takatoi, I., and Toyooka, H. **[The relations between growth of Japanese Birch and Doro Poplar and the height of the groundwater.]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (85–102). [Jap.jap.e.]

Discusses the effect of different heights of underground water on height and root growth of *Betula tauschii* and *Populus maximowiczii* growing on forest loam, peat and mixed soils. *From authors' summary.*

3186. Ziemnicki, S., and Dobrzański, B. Metoda oznaczania współczynnika przepuszczalności gleb. **[Method of determining the coefficient of soil permeability.]** *Ann. Univ. M. Curie-Skłodowska, Lublin* 8*E* (3), 1953 (41–63). 11 refs. [Pol.pol. russ.e.] A.P.B.

Illustrated description of a simple apparatus enabling the permeability of soil samples to be determined without changing their natural structure.

3187. Heikurainen, L. Havaintoja metsäojituksen vaikutuksesta turpeen lämpötalouteen. **[The effect of forest drainage on the heat economy of peat.]** *Metsät. Aikak.* 1954 (1), (31–4). 11 refs. [Fi.e.]

Results of measurements [given in graphs with English legends] show that temperatures of the peat decrease steadily with increasing distance of the groundwater from the surface and that temperatures of the peat are considerably higher throughout the growing season on wet and open than on well drained tree-covered sites. *From author's summary.*

114.2. Soil Chemistry

See also Nos. 3190–4, 3198, 3203, 3695.

3188. DOBRZAŃSKI, B., and WONDRAUSCH, J. Glin ruchomy w glebach terenów fliszowych. **[Soluble aluminium in soils of the flysch areas.]** *Ann. Univ. M. Curie-Skłodowska, Lublin* 8*E* (8), 1953 (263-81). 15 refs. [Pol.pol.russ.e.] A.P.B.

In the Carpathian area the total Al content in flysch areas depends on the stage of soil development, while the content of soluble Al is related to the vegetation or crops grown.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 3198, 3343–5, 3552–4, 3695, 3887–90.

3189. OOYAMA, N. **[Growth-inhibiting substances contained in the leaf-litter of trees. (1) The inhibiting effect on germination of coniferous seeds.]** *J. Jap. For. Soc.* 36 (2), 1954 (38–41). 7 refs. [Jap.jap.e.]

Water extracts from litter of *Pinus densiflora*, *Cryptomeria japonica* and *Chamaecyparis obtusa* inhibited the germination of seeds of the same and other species, *C. obtusa* extracts having the greatest and *P. densiflora* the least effect. Germination was low and seedling growth poor in seedbeds where dust of the leaf litter was mixed with the soil. [Cf. *For. Abstr.* 14 (No. 2981).] *From author's summary.*

3190. **Forest soils [: profile development as a result of the fixation and afforestation of the Culbin sand dunes].** *Rep. Macaulay Inst. Soil. Res. 1952/53*, [1954?] (29–30).

Mechanical analysis of the sand from both planted and unplanted dunes showed that variations in grain size may be ascribed to topographical irregularities rather than to the effect of tree growth. Profile development by leaching begins as soon as the sand is stabilized, and afforestation superimposes a circulation of nutrients. Nutrient content of the sand is lowest under young trees; after the canopy closes, enrichment of the surface soil from the litter begins, although depletion at rooting depths is still discernible. Analysis of incubated samples of surface soil from plots bearing trees shows that the rate of ammonification tends to increase with the age of the crop but more rapidly under Corsican than Scots Pine; production of nitrite or nitrate during incubation was not observed. Chemical analysis of the litter collected from the sample plots over a full year shows that at Culbin there is an abnormally abrupt decrease in the amount of Ca, K, Na, and Mg contained in litter collected in July-August. The moisture investigations have shown that moisture deficiency is greatest in afforested dunes towards the end of June, and this may interfere with nutrient uptake. [Cf. *For. Abstr.* 13 (No. 1026).]

3191. OWEN, T. H. **Observations on the monthly litter-fall and nutrient content of Sitka Spruce litter.** *Forestry* 27 (1), 1954 (7–15). 19 refs.

The monthly needle-litter deposition in a 30-year-old Sitka Spruce plantation was recorded over 2 years and the litter samples were analysed. Seasonal variation was found both in the amount and in the nutrient content of the litter-fall. Most fell in late autumn and spring, least from June to Sept. The Ca content increased from May to Nov., while N and the other minerals decreased over the same period. Average total annual litter-fall was 1832 lb. per acre; average nutrient contents, expressed as % dry weight: Ca 0·366, N 1·085, K 0·26, P 0·24, and ash, 3·35. In comparison with results recorded in Europe and America for other conifers, the Ca content of the litter is low, but since the total amount of litter deposited annually is small, and the content of other minerals is relatively high, it is suggested that pure Sitka Spruce plantations may not necessarily lead to soil deterioration. *From author's summary.*

3192. LUTWICK, L. E., and DELONG, W. A. **Leachates from decomposing leaves. II. Interaction with soil-forming materials.** *Canad. J. agric. Sci.* 34 (2), 1954 (203–13). 12 refs. (*Macdonald College Journal Series* No. 349.) O.R.E.

Leachates from decomposing leaves of *Fagus grandifolia* and *Acer saccharum* [cf. *For. Abstr.* 14 (No. 1880)] were tested for their effect on calcareous and non-calcareous parent materials and on soil from the B horizon of a groundwater podzol. Changes were also studied in the composition of the extracts obtained when the leachates were brought into contact with these soil materials. The experiments were specifically directed to finding the form or forms in which Fe exists in the leachates and in the extracts. The results of the experiments show that the pH of the extracts was usually higher than that of the leachates. The leachates extracted Fe from both the parent materials and Ca from the calcareous parent material, but lost Ca to the podzol parent material. The extract obtained by interaction of Beech leachate with soil from the B horizon of the sandy groundwater podzol was more acid than the original leachate and possessed a greater capacity to extract Fe from the parent materials than the original Beech leachate. Attempts were made to determine the chemical forms of Fe present in leachates, extracts, and leachates to which Fe salts were added. Most of the Fe present in leachates from Maple leaves was not removed from solution by passage over a cation and an anion exchange resin, but most of the Fe added to such leachates as Fe salt was retained by these resins. When Fe salts were added to Maple leachate a major part of the Fe so added was not reactive with 2,2-dipyridyl. Most of the Fe extracted by Maple leachate from the sandy parent material migrated toward the negative pole under electrodialysis. *From authors' summary.*

3193. OLIVEIRA, A. L. FRANCO DE. Estudos de pedologia florestal. Os solos do Parque de Pena, Sintra. **[Studies of forest soils. Soils of the Parque de Pena, Cintra.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 27–*B*3, 1954. pp. 46. 28 refs. [Port.e.] Limited distribution.

Soil profiles under both conifers and hardwoods were analysed and the data collected are presented and discussed. There are marked differences in the physico-chemical and chemical composition of the litter of different species. Although in general conifer litter is inferior in fertilizing substances to that of deciduous species, the litter of certain conifers (*Cupressus* spp.) is superior to certain deciduous species (*Eucalyptus* spp.) Poorest soil restitution is found with *Pinus pinaster* and *P. sylvestris*, with accompanying mor humus and podzolization. Hardwoods with *Eucalyptus globulus*, *Acacia melanoxylon* and *Castanea sativa*, and mixed hardwood/conifer stands with Pine predominating, give a better soil/vegetation equilibrium, producing a mull humus and a non-leaching soil. All the profiles sampled belonged either to the "grey-brown podzolic" or to the brown forest soil groups.

3194. VERDADE, F. DA COSTA. Estudos dos horizontes orgânicos do solo de matas, no Arenito Bauru. I. Distribuição e fraccionamento da matéria orgánica. **[Organic layers of the Arenito Bauru forest floor. I. Distribution and fractionation of organic matter.]** *Bragantia, Campinas* 11 (7/9), 1951 (195–210). 20 refs. [Port.port.e.] L.S.

Presents the results of a study made at the Pindorama Experiment Station, an area typical of the Arenito Bauru soils as a whole. The organic-matter content of the A_{00} and A_0 horizons was between 50 and 100% of that contained in the first 30 cm. of the A_1 horizon. Decomposition, even of lignin, is very rapid, with a resultant poverty of organic matter typical of these soils. It is suggested that for this soil type all fractions decompose at an equal rate, except for N compounds and water-soluble compounds. Protein content in the soil was found to increase with depth. The C/N ratio falls from 20–30 in the A_{00} horizon to 10–14 in the A_0 and A_1 horizon, to rise again in the B and C horizons.

3195. OLIVEIRA, A. L. FRANCO DE. Considerações sobre a nomenclatura e classificação das formas de humus no solo florestal. **[The nomenclature and classification of the forms of humus in forest soils.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 30 *B5*, 1954. pp. 17. 14 refs. [Port.e.] Limited distribution.

Discusses work already achieved, giving translations of the classifications of (1) Hoover and Lunt, and (2) W. L. Kubiëna, and explains the author's preference for the former.

3196. MADER, D. L. **Physical and chemical characteristics of the major types of forest humus found in the United States and Canada.** *Proc. Soil Sci. Soc. Amer.* 17 (2), 1953 (155–8). 12 refs. L.S.

Presents the results of analyses of humus samples from 41 states of the U.S.A. and 2 provinces of Canada. [Cf. *For. Abstr.* 15 (No. 22)].

3197. HANDLEY, W. R. C. **[Microbiology of *Calluna* raw humus.]** *Rep. imp. For. Inst., Oxf. 1952/53*, 1954 (9–10).

A fungus isolated from the litter of the surface layer of raw humus formed by *Calluna vulgaris* has produced a sporophore when grown on autoclaved Beech sawdust. The sporophore has the characteristics of *Hypholoma fasciculare*, a species whose sporophores are not observed on the heathland from which the organism was isolated. This organism produces white rot in sawdust. There are therefore in the mor formed from the litter of *Calluna vulgaris* organisms which could bring about the disappearance of vascular tissue as observed in the litter of *C. vulgaris* from such sites. This supports the hypothesis that mor formation should not be attributed to the accumulation of lignified plant remains.

114.4. Soil Classification. Soil Types

See also Nos. 3183–4, 3187, 3342, 3389, 3539–40.

3198. PELIŠEK, J. Podzolové půdy na svorech v lesních oblastech západní Moravy. **[The podzol soils on mica schists in the forest regions of western Moravia.]** *Acta Univ. Agric. Silv. Brno* 1952 (2), (97–114). [Cz.cz.russ.e.] I.I.E.

Describes the origin of soils due to the weathering of the mica schist bedrock, and tabulates the results of their chemical analysis.

3199. MANIL, G., COLLIN, E., EVRARD, R., GRUBER, R., and MARTIN, L. Les sols forestiers de l'Ardenne. Le plateau de Saint Hubert-Nassogne (Première étude). **[Forest soils of the Ardennes. The plateau of Saint Hubert-Nassogne (First study).]** *Bull. Inst. agron. Gembloux* 21 (3/4), 1953 (42–130). 42 refs. [F.] E.M.B.

A study in 2 parts, (1) pedological, in which the results of investigations into soil properties are presented, and (2) statistical, in which the data are analysed and mathematical relationships established.

3200. OHMASA, M. **[Forest soil profiles (1).]** Forest Experiment Station, Meguro, Tokyo. 1952. pp. 29. [Jap.E.]

Describes with diagrams and coloured illustrations 14 soil types, classified in accordance with the method adopted in the forest soil survey being conducted in the Japanese National Forests.

3201. VINE, H. **Notes on the main types of Nigerian soils.** *Special Bulletin, Nigeria Agricultural Department, Lagos* No. 5, 1953. pp. 6. Price 2*s*. 6*d*.

Systematic surveys will group the very large number of soil variations into a few hundred *soil series* (mapping units) under ca. 60 *soil associations* (generally catenas). So far this detail is available only for the cocoa areas of the Western Region. A provisional map (ca. 1:5·5 million) of Nigeria is presented, showing 9 major groupings based on drainage, leaching, mechanical composition and humus content. Deficiencies in N, P, K, and Ca, the maintenance of fertility, and the main crops and cropping practice are briefly discussed.

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See Nos. 3341, 3345, 3539–40, 3552–4, 3887 *et seq.*

114.6. Soil Biology

See also Nos. 3197, 3389, 3553, 3701.

3202. JENSEN, V., and PETERSEN, E. J. **Studies on the occurrence of *Azotobacter* in Danish forest**

soils. *Årsskr. Vet.-Landbohøjsk.* 1954 (95–108 + 8 photos.) 32 refs. [E.e.]

Typical strains of *A. chroococcum* and *A. beijerinckii* were found in most of 66 soil samples from 8 localities representing mainly Beech forest soils rich in $CaCO_3$ or with a neutral reaction.

3203. Manninger, E. Vizsgálatok az erdötalajok kémhatásának idöszakos változásairól és annak talajbiológiai kapcsolatairól. **[Research on the periodic variations of the forest-soil reaction in the light of soil biology.]** *Erdömérnöki Föiskola Évkonyve Sopron 1951/52, Budapest* 1953 (107–19). 17 refs. [Hung.hung.russ.g.]

A definite relationship was found to exist between Fehér's R value (moisture content of soil multiplied by its temperature) and both the periodic variation of soil pH and the number of soil bacteria. The decomposition processes attain their optimum aerobic condition (corresponding to the R optimum) in summer; hence the most favourable acidities are encountered in the main growth period. Autumn and winter bring low values of soil pH, and the equilibrium of decomposition is shifted towards the anaerobic processes. The soil-pH/R relationship is represented by an exponential curve.

3204. Kuźniar, K. Energia rozkładu błonnika w glebach Białowieskiego Parku Narodowego. **[Rate of decomposition of cellulose in the soils of the national park of Białowieża.]** *Acta Microbiologica Polonica, Warszawa* 1 (3), 1952 (257–69). 7 refs. [Pol. pol. russ.e.] L.S.

Experiments were made with filter-paper on glass plates, linen strips, and cellophane strips, all of which were left in soil for 12 months. In deeper profile layers the energy of decomposition (loss in weight of filter-paper) was greatest in soils of organic origin (*Fraxineto-Alnetum* and *Querceto-Carpinetum stachyetosum*) and in fertile loamy soils (*Querceto-Betuletum serratuletosum*), and smallest in loose sandy soils (*Pineto-Vaccinietum myrtilli*). Linen strips underwent maximum decomposition in the soils of organic origin; superficial decomposition was observed in fertile loamy soils, and stronger decomposition (down to 70 cm. below surface) in loose sandy soils. Cellophane was attacked in all soils to a depth of 135 cm., the order of intensity being roughly the same as for filter-paper. Fungi were primarily responsible for the decomposition in sandy soils, bacteria in others.

3205. Ziemięcka, J., and Hauke-Pacewiczowa, T. Charakterystyka mikrobiologiczna gleb Białowieskiego Parku Narodowego. **[Microbiological characteristics of the soil of the National Park of Białowieża.]** *Roczn. Nauk leśn.* 1, 1953 (43–70). 13 refs. [Pol.pol.russ.e.] (*Prace Inst. Bad. leśn.* No. 100).

Presents the results of microbiological tests of soils from 8 experimental areas (range of moisture contents 5–90%, of organic matter 2·5–90%, of pH 3·8–7·6). Soils under *Pineto-Vaccinietum myrtilli* and *Querceto-Betuletum serratuletosum* are very poor in microbe species, and contain neither nitrifying nor denitrifying bacteria. The heavier soils under "*Pseudo-Quercetum*" and *Querceto-Carpinetum* (both *typicum* and *stachyetosum*) contain more genera, including both nitrifying and denitrifying bacteria (but not *Azotobacter*). Under *Fraxineto-Alnetum* and *societas Saliceto-Franguletum cum Betuletum pubescentis* (transient forest peat soil) the microflora was well differentiated, including nitrifiers and denitrifiers (with *Azotobacter chroococcum*).

3206. Tresner, H. D., Backus, M. P., and Curtis, J. T. **Soil microfungi in relation to the hardwood forest continuum in southern Wisconsin.** *Mycologia* 46 (3), 1954 (314–33). 10 refs. P.R.

Discusses the results of a survey study of the microfungal flora of the soils in a series of upland hardwood forests in southern Wisconsin. When the average frequencies of the microfungal species were plotted along the gradient of the forest continuum, the range of the continuum over which a species was distributed and the point of its optimum development were revealed. *Spicaria violacea* and *Penicillium nigricans* were typical "climax" species; *Penicillium janthinellum*, *Mucor ramannianus* and *Oospora sulphurea* were "pioneer" species, and *P. granulatum* was an intermediate type. In analogy with the situation in the higher plant cover, the forest soil microfungi in southern Wisconsin do not form discrete communities, but a series of progressively changing species combinations along the gradient of the forest continuum.

114.7. Soil Surveys and Surveying

See No. 3936.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 3190, 3552, 3587, 3667, 4417, 4420.

3207. **Proceedings of the Ankara symposium on arid zone hydrology jointly organized by the Government of Turkey and Unesco.** *Arid Zone Programme, Unesco, Paris* No. 2, 1953. pp. 268 + [2]. Many refs. Price £1. 10*s*.

[Cf. *For. Abstr.* 15 (Nos. 3340, 3394).] Deals with a number of aspects of the hydrology of underground water in arid zones.

3208. Glover, Sir H. M. **Soil conservation in parts of Africa and the Middle East. Part 2. The Middle East.** *Emp. For. Rev.* 33 (2), 1954 (136–41 + 10 photos).

Notes on a tour in Cyprus and Syria. [Cf. *For. Abstr.* 15 (No. 1067).]

3209. Gorrie, R. M. **Forestry development and soil conservation in the Upper Damodar Valley—a 15-year scheme.** Damodar Valley Corporation, Alipore, Calcutta. [1954?]. pp. 72 + map + 8 photos.

Discusses causes of erosion and previous reclamation and afforestation schemes (not implemented), and outlines a programme of afforestation, torrent training, and erosion control.

3210. Castillo A., J. B. Conservación de suelos. **[Soil conservation.]** *Bol. Ingen. for. Univ. Los Andes* Nos. 1–2, 1954 (13–5; 26–9). [Span.]

General notes on soil exhaustion with particular reference to undesirable agricultural practices in Venezuela.

3211. **The Sierra Ancha experimental watersheds.** Southwestern Forest and Range Experiment Station, Tucson, Arizona. 1953. pp. 32.

An account of their situation and general characteristics and of research carried out.

3212. WILM, H. G. **Watershed management problems in the Central Rocky Mountain region.** *J. For.* 52 (5), 1954 (343–6). 1 ref.

For the high-altitude forests, recommends stepping up timber (and thereby water) production; for the Ponderosa Pine/grasslands zone, the rehabilitation of forest and range for water stabilization and quality; for the grass/woodland and the Great Plains, even more drastic rehabilitation (revegetation and engineering works) to minimize floods and erosion.

3213. LULL, H. W. [Compiler]. **Evapo-transpiration: excerpts from selected references.** *Occ. Pap. Sth. For. Exp. Sta.* No. 131, 1953. pp. 117.

Quotes extracts, arranged under the headings general discussion, evaporation, transpiration, evapo-transpiration, roots and soil moisture, and roots, from 76 articles, monographs etc. There is an index to the authors cited.

3214. HESMER, H., and FELDMANN, A. Der Oberflächenabfluss auf bewaldeten und unbewaldeten Hangflächen des südlichen Sauerlands. **[Surface run-off on forested and unforested slopes in southern Sauerland.]** *Forstarchiv* 24 (11/12), 1953 (245–56). 29 refs. [G.g.]

High surface-run-off rates have sometimes been attributed in Germany to pure Spruce plantations and to coppice. As these are especially common forms of forest in Sauerland, the most important catchment for the Ruhr, a study was made to end speculation by providing experimental data. Infiltration measurements were made on 1 × 2 m. plots, with artificial rain, in the Olpe district at different seasons and under different weather conditions (none on frozen soil), chiefly in Oak/Birch coppice worked on a 20-year rotation, in Spruce of various ages, and on Spruce clear-fellings, along with a few studies under deciduous high forests, in pasture and meadows, and on arable land (bare, ready for sowing, or under stubble). The soils on the slopes were stony, mostly sandy loams, classified as shallow to moderately deep podzolic brown earths. No rain was supplied to a 10-cm. strip at the bottom end of the plots, just above the collecting gutter. Stress is laid on the importance of this procedure to eliminate the "tile effect" (i.e. diagonal seepage through the soil cover, producing merely apparent run-off of water that has not yet rached the actual soil)—an effect which may have caused over-estimates of run-off in some studies in the U.S.A., India and Java. As regards plot size, it is held that the results from small plots err on the right side, i.e. they over-estimate the run-off from the whole hillside. Results are tabulated and discussed with the following conclusions: (1) Forest soils showed a very high infiltration capacity on most plots, and run-off, when it occurs at all, accounts for a very small % of annual precipitation and is far from being as significant as is sometimes supposed. (2) Under coppice, run-off is normally non-existent even in very heavy rain. A very small run-off was observed only with very heavy rain on ca. 2-year-old clear-felled coppice areas where the scanty litter had decomposed and plant cover was not yet re-established; and even this run-off appeared to be mostly absorbed by the loose soil round stumps or on areas where there were patches of litter or plant cover. (3) Under Spruce of all age classes the heaviest rainfall was all absorbed so long as the litter was moist. Run-off is possible when litter and raw humus have dried out, but with the normal rainfall distribution in this region, heavy rain after long drought is exceptional. (4) On clear fellings in Spruce, whether in the first few years with litter cover or after plant cover had been established, infiltration was similar to that under Spruce stands. Even with heavy rain after severe drought, areas with only litter and/or raw-humus cover differed little, though they naturally dry out more rapidly. A heavy covering of slash in one instance kept the litter moist enough to prevent run-off in heavy rain after ca. 30 days' drought. On one 5-year-old felling area a portion that had been limed and was covered with dense ground vegetation, showed poorer infiltration (though no real risk of significant run-off in practice) than an unlimed portion with moist litter and humus in the earliest stages of plant colonization: here rapid decomposition of the litter and humus on the limed plot, exposing the soil to compaction in spite of the plant cover, was probably responsible for this effect. (5) No run-off occurred under deciduous high forest with litter or plant cover. (6) Apart from the exceptions noted, the all-important factor causing run-off is exposure of the mineral soil or topsoil poor in humus, e.g. by skidding or fire. Especially high run-off was found for skidding trails running up and down slope in coppice areas. (7) There seems to be no case for contour trenching in the forest or on felling areas. (8) Of the areas in agricultural use, permanent pastures showed the most severe run-off. Arable land would be endangered only in quite exceptionally heavy rains.

Table values show the duration of the artificial rain as being from 10 to ca. 40 min. A summary table is also included, indicating for 4 groups of run-off hazard the rain intensities at which run-off appeared. Run-off is counted as impossible in the region when this value is not reached until the intensity exceeds ca. 2¼ mm./min. Under old 2nd-generation Spruce with moist humus and under deciduous high forest with litter or ground vegetation the highest intensities used—ca. 3–4 mm./min. for 13–16 min.—caused no run-off.

3215. KAWAGUCHI, T., and TAKIGUCHI, K. **[Experiments on the function of ground cover in erosion control. (Preliminary report).]** *J. Jap. For. Soc.* 35 (3), 1953 (73–7). 2 refs. [Jap.e.]

In field experiments, soil erosion on a 57·7% slope was found to be due mainly to the force of the [natural] rain striking the ground, and ground cover, such as litter, was more important than the tree stems, branches or leaves. In laboratory experiments, the presence of ground cover was found to have more influence on soil erosion from rain drops than the slope gradient; but on steep slopes surface run-off must be considered as well as the direct impact of the rain. In surface run-off the slope gradient was more important than the presence of ground cover, and on steep slopes forest litter had little or no effect. *From authors' summary.*

3216. Pereira, H. C. **Water use of catchment vegetation.** *Rep. E. Afr. agric. For. Res. Organ. 1953* [1954?] (53–6).

[Cf. *For Abstr.* 14 (No. 159).] Details the water use of stands of (*a*) Bamboo [*Arundinaria alpina*], (*b*) 16-year Cypress and (*c*) Kikuyu grass (*Pennisetum clandestinum*) in an area near Nairobi. In a very dry year (rainfall 30 in.) neither (*a*) nor (*b*) provided water for deep storage. In a year of 38 in. (*b*) used 4 in. less in transpiration and evaporation and passed 4 in. more to below the 6-ft. level than (*a*). In the first 3 months of hot and dry weather of an unusually wet year (60 in.) there was a greater deficit at 4–6 ft. under (*a*) than under (*b*) and, after the rains, conditions favourable for percolation below the main root zones continued for 5 weeks longer under (*b*), during which the fall of 5 more inches increased its storage opportunity. Since transpiration is periodically reduced at the felling, clearing and early regrowth stages of (*b*), the over-all advantages to river flow of replacing Bamboo by Cypress are considerable. Observations over 5 years in the 11-acre catchment of (*c*) show no run-off or stream flow, though a permanent stream is reported to have existed under the tall bush conditions that formerly prevailed. A table shows the grass-root distribution by volume for each foot down to 15 ft. The top 4 ft. of soil under grass, even when below field capacity, can be by-passed by some rainfall, through old root channels, insect burrows and cracks, to augment supplies at 10–15 ft. during intense falls even in very dry seasons.

3217. Hoover, M. D., Olsen, D. F. Jr., and Greene, G. E. **Soil moisture under a young Loblolly Pine plantation.** *Proc. Soil Sci. Soc. Amer.* 17 (2), 1953 (147–50). 4 refs. L.S.

Presents the results of observations made from 1950 to 1952 in a stand planted in 1941 and carrying 760 stems/acre in 1951. Rainfall during this period was abnormal, i.e. deficient from Sept. 1949 until the winter of 1951–52, with an extremely dry, hot period from May to July 1952. Stem-flow was measured in gauges, soil moisture (to a depth of 66 in.) with fibreglass electrodes. Total rain reaching the ground (net rainfall) averaged 86% of that measured in the open and no less than $\frac{1}{8}$th of this amount flowed down the stems. The severity of the drought was shown by the soil moisture measurements. During the 1951 growing season current rainfall supplied almost all the moisture used by the trees. Soil was at wilting point for most of August, but no wilting occurred among the Pines, though barkbeetle damage was observed. The 1951-52 records show that the soil can store about 10 in. of water in winters of abundant rainfall. It was also noted that the Pine can remove water at depths of 5 ft. at a rapid rate, and that, in fact, the water is drawn from the level at which it is most readily available, no matter what the depth. Because of this withdrawal of moisture at all levels, the upper 5$\frac{1}{2}$ ft. of soil has a large storage capacity for the autumn and winter rainfall. [Cf. *For. Abstr.* 14 (No. 3004).]

3218. Wilde, S. A., Steinbrenner, E. C., Pierce, R. S., Dosen, R. C., and Pronin, D. T. **Influence of forest cover on the state of the groundwater table.** *Proc. Soil Sci. Soc. Amer.* 17 (1), 1953 (65-7). 10 refs. L.S.

Groundwater levels were determined on forested and cut-over sites of central and northern Wisconsin by observation of open wells during frost-free periods. In non-podzolic, coarse, sandy soils, groundwater possesses considerable mobility, and forest cover effected only a slight lowering of the water level, not exceeding 9 in. The influence of forest cover was most pronounced in the middle of the growing season. In strongly podzolized, morainic soils, however, clear cutting of Aspen stands produced an average rise of 14 in., and converted a reasonably well-drained soil into a semi-swamp. In the rainy spring and summer of 1952, this rise was accompanied by increased run-off, erosion, and damage to roads. *From authors' summary.*

3219. **Clear cutting raises water level in flatwoods.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 34, 1954 (17–8). (*Rep. Stheast. For. Exp. Sta. 1953*).

In recent studies in tidewater Virginia, the water-table was at a higher level during the growing season in clear-felled strips than in uncut strips or an adjacent selection stand. During the period 14-28 September, 3·21 in. of rain raised the water-table about 3 ft. in the clear-felled area and only insignificantly 2 chains within the selection forest.

3220. Shirai, J., Kondo, M., and Ohara, C. **[Experiments in water conservation at Tatsunokochi. Bulletin 4. The difference in run-off before and after felling.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (95–122). 10 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 13 (No. 3580).] Measurements [given in graphs and tables with English legends] on rainfall, run-off and water retention by the soil, show that flood control and water conservation in the two areas already examined were decreased by clear felling. *From authors' summary.*

3221. Maruyama, I., and Neta, K. **[Experiments on forest influence on stream-flow at Kamabuti. Second report.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (123–32). 10 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 14 (No. 957).] Equations are presented for daily run-off and the changes caused by clear felling. Results of measurements are shown in graphs and tables with English legends.

14. SYSTEMATIC ZOOLOGY

145.7. Insecta. Entomology

See also Nos. 3783 *et seq.*, 4270 *et seq.*

3222. Chaudhry, G. U. **A useful termite.** *Pakistan J. For.* 4 (1), 1954 (31–2 + 5 photos.)

A note on *Archotermopsis wroughtoni*, living only in damp, decaying wood (old stumps etc.) which it helps to decompose.

3223. Neves, C. M. Baeta. Nota sobre três espécies florestais de Aphidoidea novas para a entomofauna da Ilha de Madeira. **[Three forest species of the Aphidoidea new to Madeira.]** *Agros* 36 (6), 1953 (223–6). 4 refs. [Port.] A.P.B.

Cinara pinihabitans, *Tuberolachnus saligna* and *Pineus sylvestris*.

3224. Walsh, G. B., and Dibb, J. R. [Editors]. **A coleopterist's handbook.** *Amateur Entomologist, London* Vol. 11, 1954. pp. 120 + 20 plates. Price 15*s*.

3225. Schedl, K. **Bark- and ambrosia-beetles from Indo-China. 127. Contribution to the morphology and taxonomy of the Scolytoidea.** *Revue Française d'Entomologie, Paris* 20 (2), 1953 (123–30). [E.] L.S.

3226. Baldwin, W. F., and House, H. L. **Studies on the effects of thermal conditioning in two species of sawfly larvae.** *Canad. J. Zool.* 32 (1), 1954 (9–15). 16 refs. O.R.S.

Conditioning larvae of *Neodiprion lecontei* and *N. sertifer* to moderately high temperatures increased their heat tolerance.

3227. Rao, S. N. **On a collection of Indian Ichneumonidae (Hymenoptera) in the Forest Research Institute, Dehra Dun.** *Indian For. Rec. (Entomology)* 8 (8), 1953 (159–225).

3228. Sasakawa, M. **Descriptions and records of dipterous leafminers from Japan (Agromyzidae) I.** *Scientific Reports, Saikyo University, Kyoto: Agriculture* No. 4, 1953 (9–22). [E.] P.R.

Includes a key to the *Phytomyza* species, and a description of 4 species.

15. ANIMAL ECOLOGY. GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING

See also Nos. 3768 *et seq.*, 4417.

3229. Park, O., and Auerbach, S. **Further study of the tree-hole complex with emphasis on quantitative aspects of the fauna.** *Ecology* 35 (2), 1954 (208–22). 31 refs.

[Cf. *For. Abstr.* 12 (No. 2811).]

3230. Sody, H. J. V. Vogels van het Javaanse djatibos; met overwegingen over nut en schade voor dit bos. **[Birds of the Javanese Teak forests and a consideration of their value and damage in it.]** *Madj. Ilmu Al. unt. Indones.* 109 (4/6), 1953 (125–72). [Du.] E.M.B.

Lists 167 species reported in Teak forests since 1853, with some indication of their food and to what extent they are dependent on the forest (e.g. for food, shelter, nest sites) or are merely chance visitors, and discusses their value in insect control.

3231. Kimber, P. C. **Avifaunal changes due to afforestation in the Breckland area of East Anglia.** *Coedwigwr* 2 (2), 1954 (47–53 + 2 photos). 1 ref.

3232. Grisez, T. J. **Results of a mouse census in a Spruce-Fir-Hemlock forest in Maine.** *For. Res. Notes Ntheast. For. Exp. Sta.* No. 28, 1954. pp. 2.

3233. Lepp, E. **Planning for wild life in our forests.** *Agriculture (J. Minist. Agric., Lond.)* 60 (11), 1954 (532–7). O.R.E.

Ways of encouraging populations of wild mammals, birds and fish in the forests of Great Britain.

16. GENERAL BOTANY

160. *Plant Chemistry*

See also Nos. 3191–3, 3249, 3368, 3831, 4081–114, 4363 *et seq.*

3234. Rozsa, J. I., and Golland, J. D. **Spectrochemical analysis of leaf and biological materials.** *Applied Spectroscopy, New York* 7 (3), 1953 (125–6). 2 refs. L.S.

Describes the application of the combined fusion and concentration spectrographic techniques to the analysis, *inter alia*, of the leaves of Apple, Pear, Peach, and Cherry.

3235. Camefort, H. Présence et localisation de l'acide ribonucléique dans le point végétatif de quelques gymnospermes. **[The presence and localization of ribonucleic acid in the growing point of some gymnosperms.]** *C. R. Acad. Sci., Paris* 238 (8), 1954 (922–4). 1 ref. [F.] O.R.S.

During the growing period, ribonucleic acid was found, in *Taxus baccata*, *Cupressus macrocarpa* and *Picea abies*, mainly in the initial ring below the apical cells and not in the cells themselves. The same was true for *C. macrocarpa* in winter as well, but in the other two species there was little of the acid present in the initial ring.

3236. Hattori, S., Yoshida, S., and Hasegawa, M. **Occurrence of shikimic acid in the leaves of gymnosperms.** *Physiol. Plant., Copenhagen* 7 (2), 1954 (283–9). 16 refs. [E.e.]

The authors have confirmed the wide occurrence of shikimic acid in gymnosperms by paper partition chromatography. Shikimic acid was present in concentrations of 1–10 mg./g. fresh weight in species of Taxodiaceae and Pinaceae, and 0·5 mg./g. fresh weight in species of Taxaceae and Cupressaceae.

3237. Dakshinamurti, K. **The amino acids in the leaf of *Azadirecta* [sic] *indica* (Melia) [*Melia azadirachta*].** *Curr. Sci.* 23 (4), 1954 (125). 4 refs. A.P.B.

3238. Hasegawa, M., and Shirato, T. **Two new flavonoid glycosides [phellamurin and amurensin] from the leaves of *Phellodendron amurense* Ruprecht.** *J. Amer. chem. Soc.* 75 (22), 1953 (5507–11). 8 refs. [Government Forest Experiment Station, Meguro, Tokyo.] O.R.S.

3239. Meyer, J. Sur l'accumulation et l'origine de lipides dans certains tissus nourriciers de galles. **[The accumulation and origin of lipides in nutritive**

tissues of galls.] *C. R. Acad. Sci., Paris* 238 (9), 1954 (1066–9). 8 refs. [F.f.] O.R.S.

The material studied included galls of *Neuroterus quercus-baccarum* on *Quercus robur* [cf. *For. Abstr.* 13 (Nos. 2788–9).]

161. *Physiology*

See also Nos. 3189, 3213, 3216–7, 3235, 3239, 3269, 3292, 3356–60, 3364, 3366, 3473, 3673, 3683, 3722, 3740–2, 3881.

3240. ***Annual review of plant physiology.*** Annual Reviews Inc., Stanford, Calif. No. 5, 1954. pp. 399. Many refs. Price $7.00.

Includes the following review articles, containing references to many forest species: Mechanism of action of micronutrient elements in enzyme systems (*W. D. McElroy* and *A. Nason*); Nutrition by foliar application (*D. Boynton*); Mineral nutrition of phytoplankton (*B. H. Ketchum*); Soil conditioners (*J. H. Quastel*); The photosynthetic function of pigments other than chlorophyll (*L. R. Blinks*); Localization of enzymes in the cells of higher plants (*D. R. Goddard* and *H. A. Stafford*); The physiology of plant tumors (*A. C. Braun*); Tropism and nastic movements (*L. Brauner*); Dormancy in woody plants (*R. M. Samish*); Post-harvest physiology of fruits and vegetables (*W. T. Pentzer* and *P. H. Heinze*); Physiological aspects of fungus disease of plants (*P. J. Allen*); The rôle of plant physiology in plant geography (*H. L. Mason* and *P. R. Stout*); Photosynthesis (*R. Lumry*, *J. D. Spikes* and *H. Eyring*); Occurrence, formation and inactivation of auxins (*S. A. Gordon*).

3241. Harley, J. L., Brierley, J. K., and McCready, C. C. **The uptake of phosphate by excised mycorrhizal roots of the Beech. V. The examination of possible sources of misinterpretation of the quantities of phosphorus passing into the host.** *New Phytol.* 53 (1), 1954 (92–8). 4 refs. [Department of Botany, University of Oxford.] O.R.S.

Concludes, after an analysis of possible sources of error, that errors in estimation are likely to be small, and that over-estimation is more probable than under-estimation. [Cf. *For. Abstr.* 14 (No. 3162).]

3242. Farrar, J. L. **Distribution of radio-phosphorus in Red Pine seedlings.** *Silv. Leafl. For. Br. Can.* No. 78, 1953. pp. 4. 6 refs.

An investigation of the movement of radioactive P taken up by the roots was made on a 3-year-old *Pinus resinosa* at Petawawa. The most noticeable fact observed about the radioactivity in an active plant was its uneven distribution. Usually there was low activity at the base of the main stem next to the ground. In some cases the main stem was active throughout its length, but more often the activity would be concentrated in one of the branches while the upper part of the main stem had only a low level of activity. This suggests that certain roots supply nutrients to certain branches. Even in active branches, the buds had a very low level of radioactivity.

3243. Mathiesen, A. Die Geschwindigkeit und der Verlauf des Transpirationstromes bei der Birke. **[The velocity and course of the transpiration stream in Birch.]** *Skr. K. Skogshögsk., Stockh.* No. 5/6, 1951 (10–24). 24 refs. [G.g.]

The dye-injection method (0·1% eosin or light green) was used to study the rate of flow and the path in the stem of the transpiration stream in 55 Birch trees (*Betula pubescens* and *B. verrucosa*) 4·5–27 m. high (13–95 years old), the stems being sectioned at times varying from 3 to 24 hours (and longer in a few instances) after the beginning of injection, in order to reveal the distribution of the dyes. For the 3-hr. test period, the mean rates of flow (with a correction intended to eliminate the lag due to the added dye) varied from 1·9 to to 2·25 m./hr. in the basal portion of the stem for the period of the daily maximum; the daily course of the curves followed the transpiration curve, with some lag in time. In the crown portion of the stem the rate of flow was slower than in the clear bole. In 30- to 40-year-old trees the stream ascended in all annual rings, and in older trees the dye was found in at least 43 rings. Both radial and tangential movements of the dye were observed: the latter movement was strong and indicated that the stream followed a gradual spiral course inside the individual rings—steeper in the outer than in the inner ones. This could not be explained entirely in terms of inclination of the grain.

3244. Walter, H., and Zimmermann, W. Ökologische CO_2-Absorptionsmessungen in verschiedenen Pflanzenbeständen. **[Measurements of CO_2 absorption in different plant communities.]** *Zeitschrift für Botanik, Jena* 40, 1952 (251–68). 31 refs. [G.g.] O.B.D.

Measurements over bare land, over various crops and in 2 types of forest cover—Oak/Hornbeam and a deciduous stand with a shrub layer and thick grass.

3245. Hygen, G., and Midgaard, E. **A reinvestigation of the influence of varying air humidity on cuticular transpiration in *Pinus silvestris* L.** *Physiol. Plant., Copenhagen* 7 (1), 1954 (128–40). 13 refs. [E.e.]

The cuticular transpiration of excised Pine needles of various ages was determined at different levels of atmospheric vapour pressure deficit, and no evidence was found for the striking irregularities previously observed by Gäumann and Jaag in pre-darkened plants supposed to have completely closed stomata. It appears to be impossible to distinguish between slightly open and completely closed stomata by the usual methods for aperture measurement. Experiments on the effect of darkening indicated that the stomata may remain partly open even during prolonged dark periods. *From authors' summary.*

3246. Georgescu, C. C., and Catrina, I. Contribuţii la cunoaşterea transpiraţiei speciilor forestiere din perdelele de protecţie. **[The transpiration of shelterbelt tree species.]** *Rev. Pădurilor* 68 (1), 1953 (12–4). 4 refs. [Rum.rum.russ.]

Gives the results of observations on the transpiration rate of *Quercus pedunculiflora* and "Turkestan Elm" [*Ulmus pumila* var. *arborea*?] in shelterbelts at Baragan. Oak transpired 292 mg./are/hr. and

Elm 160 mg./are/hr., which confirms the belief that these species are exceptionally drought-resistant.

3247. Montfort, C. Hochsommerliche Veränderungen des Chlorophyllspiegels bei Laubbäumen von gegensätzlichem photochemischem Reaktionstypus. **[High summer changes in the chlorophyll status of broadleaved trees of contrasting photochemical reaction types.]** *Planta* 42 (5), 1953 (461–4). 8 refs. [G.] O.B.D.

3248. Kikuya, A. **[Seasonal changes in starch reserves in the xylem parenchyma of "Konara" (*Quercus serrata*).]** *J. Jap. For. Soc.* 35 (6), 1953 (191–3). 7 refs. [Jap.e.]

Samples were taken from trees 6-15 years old, from the main roots, at 0·2 m. and 1·2 m. above ground, and from the topmost and the lowest branches, at intervals of 10 days, over 1 year. In all parts starch reserves decreased considerably in June after the buds opened and to some extent in August during the period of lammas growth. Reserves were at their maximum in early winter. In the top branches only, reserves decreased in winter and increased in early spring before the buds opened. *From author's summary.*

3249. Ceruti, A., and Scurti, J. Sulla formazione delle gomme nel ciliego (*Prunus avium* L.). Nota I. Morfologia. Nota II. Istochimica. **[Gum formation in the Cherry (*Prunus avium*). I. Morphology. II. Histochemistry.]** *Ann. Sper. agr.* (*n.s.*) 8 (2), 1954 (489–518 + 6 plates). 50 refs. [It.it.e.] C.G.B.

3250. Nairn, L. D. **Growth patterns in Tamarack.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (1), 1954 (3–4).

The method proposed by Duff and Nolan [cf. *For. Abstr.* 15 (No. 81)] of using cambial age and apical activity for studying the extrinsic factors in young trees instead of the conventional radial growth at stump level, was applied to a study of *Larix laricina*. Data from both methods are compared, and it is concluded that results do not warrant the laborious process involved in the new method.

163. *Embryology*

3251. Rao, C. V. **Contributions to the embryology of Sterculiaceae. IV. Development of the gametophytes in *Pterospermum suberifolium* Lam.** *J. Indian bot. Soc.* 31 (4), 1952 (251–60). 10 refs. O.B.D.

164. *Morphology*

See also Nos. 3298, 3315, 3511–2, 4376–7.

3252. Carpenter, I. W., and Guard, A. T. **Anatomy and morphology of the seedling roots of four species of the genus *Quercus*.** *J. For.* 52 (4), 1954 (269–74). 15 refs.

The anatomy and morphology of the young primary roots of *Quercus alba*, *Q. bicolor*, *Q. rubra*, and *Q. palustris*, as affected by two different soil types, have been described. Wide morphological differences exist between the species, which seem to be correlated in part with acorn size. The plants grown on Oaktown forest soil were universally mycorrhizal, whereas plants grown on agricultural Brookston soil were not. In all species examined there was a very early initiation of phellogen. In may instances phellem was present before the initiation of branch roots from the pericycle. A pith is present in all the primary roots examined, but its structure and size varied with the species. *Q. alba* produced a large pith extending for more than 40 cm. in a four-month-old root, whereas *Q. palustris* produced a very small pith which did not extend beyond the first few cm. of the primary root. The soil type had little direct effect on the anatomy or morphology of the primary root, though the roots grown on the lighter soil were less susceptible to root rot. It was found that although the genus *Quercus* is tap-rooted, very often, owing to environmental factors, the tap-root fails to develop and a lateral root system is formed. *From authors' summary.*

165. *Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation*

See also Nos. 3293, 3307, 3321–3, 3325, 3365, 3367, 3430, 3440–7, 3452–5, 3514, 3748, 3752–3, 3758, 4432–3.

3253. Šimák, M. Über die Samenmorphologie der gemeinen Kiefer (*Pinus silvestris L.*). **[The seed morphology of *P. sylvestris*.]** *Medd. SkogsforsknInst., Stockh.* 43 (2), 1953. pp. 32. 12 refs. [G.g.e.sw.]

Properties examined were seed size, seed shape (dimensional ratios) and peculiarities in the shape of the micropyle (illustrated). Seeds from trees from different parts of Sweden were examined. Two methods were applied in the choice of material—the sample test in which seeds were picked at random after mechanical extraction and cleaning, and the selection test where all seeds from a certain number of cones from a given tree were removed by hand and examined in relation to cone size and position in cone. Results included the following: (1) In the selection test, and to some extent in individual cones, full seeds tended to be longer than empty ones; less difference was apparent in the sample test. (2) Seed length increased with cone size, seeds at the base of the cone were smallest, those in the middle largest, and those at the top smaller again. (3) Examination of a small sample indicated that seeds from the S. side were larger than those from the N. side of the tree and the weather over 3 years also appeared to affect seed size. (4) Seed shape appeared to be independent of the external factors examined. (5) The peculiarities in shape of the micropyle appeared to be characteristic of the parent tree and independent of external factors.

3254. Fischer, F. Forstliche Pflanzenzüchtung als ein Mittel zur Steigerung des Waldertrages. **[Forest tree-breeding as a means of augmenting production.]** *Schweiz. Z. Forstw.* 105 (3/4), 1954 (165–83). 26 refs. [G.g.f.]

Lays emphasis on the importance of using vegetatively propagated clones with known good qualities, as a short-term policy, pending the results of long-term breeding programmes.

3255. LANGNER, W. Die Entwicklung der Forstgenetik und Forstpflanzenzüchtung in Deutschland. **[The progress of forest genetics and forest tree breeding in Germany.]** *Z. Forstgenet.* 3 (3), 1954 (55–60). Many refs. [G.]

A short review with an extensive bibliography.

3256. TOYAMA, S. **[Studies on breeding forest trees.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 66, 1954. pp. 269 + 11 plates. 15 pp. of refs. [Jap.e.]

Summarizes results of investigations on (1) the characteristics of plants from seed of 223 parent trees of *Cryptomeria japonica* from 5 climatic regions; (2) the morphological, physiological, and cytogenetical characters of an élite tree of *Pinus thunbergii*; and (3) the effects of artificial mutation by X-ray treatment on *P. densiflora*, *P. thunbergii*, *Cryptomeria japonica* and *Chamaecyparis obtusa* and by colchicine on these 4 species and *Larix leptolepis*. *From author's summary.*

3257. SCHAFFALITZKY DE MUCKADELL, M. Bøgeforædlingens arbejde og opgaver. **[Aims and methods in Beech breeding work.]** *Dansk. Skovforen. Tidsskr.* 37 (6), 1952 (323–9). 8 refs. [Dan.]

A review in general terms of the state-subsidized work in progress under the direction of the Arboretum, Hørsholm, Denmark, mentioning *inter alia* the success of open-air grafting in 1951 (a 75% take in 2500 graftings), the ease of crossing *Fagus sylvatica* with *F. orientalis*, and the failure as yet to obtain crosses with *F. grandifolia*, *F. sieboldii*, *F. engleriana* and *F. japonica*.

3258. LĂZĂRESCU, C. Metode Miciuriniste de selecţie forestieră. **[Michurinist methods of forest tree breeding.]** *Rev. Pădurilor* 68 (8), 1953 (3–6). 6 refs. [Rum.rum.russ.]

Includes some notes on tree-breeding experiments in Rumania: (1) grafting various species of Oak on *Quercus robur*; (2) a "hybrid" Ash (*Fraxinus pennsylvanica* grafted on *F. excelsior*); and (3) a *Juglans nigra* × *J. regia* hybrid.

3259. CIRIN, A., and BUNDĂU, I. Hibridarea vegetativă a salbei. **[Vegetative hybridization of *Euonymus*.]** *Rev. Pădurilor* 69 (3), 1954 (140–1). 4 refs. [Rum.]

Describes experiments in grafting *E. verrucosus* on to *E. europaeus* which, when the graft was made just above the root collar, is said to have produced an intermediate form. Grafts made higher up did not have this effect. [Cf. *For. Abstr.* 13 (No. 962).]

3260. NATIVIDADE, J. V. La sélection et l'amélioration génétique du chêne-liège au Portugal. **[Selection and breeding of *Quercus suber* in Portugal.]** *Rev. for. franç.* 6 (6), 1954 (346–54 + 2 photos). 11 refs. [F.f.]

Improvement of Cork Oak stands in Portugal has customarily been effected simply by selection cutting in favour of desirable trees. More recently a programme of breeding has been undertaken, and the methods adopted are briefly described: they consist in selection of élite trees and the establishment of clones from them by vegetative propagation. The need to supplement these measures by genetical measures is discussed.

3261. ROHMEDER, M. Ein zweckmässiges Bestäubungsgerät. **[A useful pollen-dusting apparatus.]** *Z. Forstgenet.* 3 (3), 1954 (54–5). 5 refs. [G.]

Describes, with illustrations, a small and convenient hand tool, consisting essentially of a rubber bulb, glass cylinder, and nozzle, for applying pollen to flowers in plant-breeding work.

3262. DUFFIELD, J. W. **Studies of extraction, storage, and testing of Pine pollen.** *Z. Forstgenet.* 3 (2), 1954 (39–45). 17 refs. [E.g.]

The results show that Pine pollen, though more long-lived than many angiosperm pollens, is sensitive to temperature and moisture conditions, and that temperature and humidity should be under control during extraction. The report shows the need for further investigations on pollen physiology and biochemistry.

3263. ORR-EWING, A. L. **Inbreeding experiments with the Douglas Fir (*Pseudotsuga taxifolia* (Poir.) Britton).** *For. Chron.* 30 (1), 1954 (7–16 + 4 plates). 11 refs.

Two young Douglas Fir were self-pollinated in 1952 and results showed a wide variation in self-incompatibility, one tree producing a fair number of viable seeds. It is suggested that a considerable range of incompatibility following selfing exists within the species and that this is due to some factor that inhibits normal seed development in varying degrees. Cytological examination of material from the highly self-incompatible trees showed that the embryo aborted at an early stage following self-pollination. The harmful effects of inbreeding were clearly seen in the progeny of the one tree, there being highly significant difference in height growth when compared with seedlings resulting from controlled cross- and wind-pollination of the same tree. The importance of the selfing technique and the practical implications of inbreeding are emphasized. A few viable seeds were obtained from unpollinated cones, the resulting seedlings are very uniform, and cytological examination has shown that they are diploid. Further investigations on self-incompatability and agamospermy in the Douglas Fir are being pursued. *Author's abstract.*

3264. SIMMONDS, N. W. **Chromosome behaviour in some tropical plants.** *Heredity* 8 (1), 1954 (139–46). 19 refs. O.R.S.

Lists chromosome numbers for 87 species, including some trees.

3265. HYUN, S. K. **Induction of polyploidy in Pines by means of colchicine treatment.** *Z. Forstgenet.* 3 (2), 1954 (25–33). 21 refs. [E.e.g.]

A report on experiments at the Seoul National University from April to Nov. 1951. (1) *Soaking stratified Pine seed in colchicine solution*: No abnormalities were produced, but germination may have been stimulated. (2) *Soaking one side of germinating Pine seeds in colchicine solution on filter paper*: Various kinds of polyploid were produced. Small seeds reacted more to colchicine than large. No polyploids resulted from treatment of *Pinus jeffreyi* and *P. lambertiana*. Some polyploid plants were stable; others reverted to the diploid condition. (3) *Grafting experiments*: Since the very abnormal seedlings from colchicine-treated seeds died from lack of an effective root system, attempts were made to graft some of the polyploids on healthy stock. Grafts of very abnormal seedlings failed, but successful grafts with moderately abnormal seedlings were obtained fairly readily. Shoot treatment was less effective than seed treatment in producing stable polyploids. Very abnormal (probably polyploid) seedlings were obtained by treating seeds from which seed coats and integuments had been removed. This should prove an effective method of inducing polyploidy.

3266. Stefanik, L. A növénycönológia erdömüvelési vonatkozásai. I. A magszármazási kérdés. **[Relationship between phytocenology and silviculture. I. Problems of seed provenance.]** *Erdömérnöki Föiskola Évkönyve Sopron 1951/52, Budapest* 1953 (195–216). 16 refs. [Hung.russ.g.]

Points to the possibility of distinguishing between varieties of species, if the corresponding varieties of forest association are differentiated. The seeds derived from a stand should be sown in areas belonging to the same forest community.

3267. Seitz, F. W. Über das Auftreten von Triploiden nach der Selbstung anomaler Zwitterblüten einer Graupappelform. **[The occurrence of triploids after self-pollination of anomalous androgynous flowers of a Grey Poplar.]** *Z. Forstgenet.* 3 (1), 1954 (1–6). 13 refs. [G.g.e.]

In 1953 a number of plants were raised from self-pollinated catkins of the androgynous clone found at Dillingen [cf. *For. Abstr.* 15 (No. 99)]. Most of the plants were diploids ($2n = 38$) but 1% were triploids ($2n = 57$). The triploids appear to arise from a failure in the reduction division of some of the pollen mother cells. The spontaneous triploids of the section *Leuce* which are found in nature probably arise in this manner. Some individuals were found with both diploid and triploid tissue, apparently the result of a downward adjustment of the triploid condition during the course of development. *From author's summary.*

3268. Gambi, G. Il pioppo tremulo dell' Aspromonte. **[The Aspromonte Aspen.]** *Monti e Boschi* 5 (4), 1954 (161–4). [It.f.e.]

Describes a race of *Populus tremula* of particularly good form and vigorous growth, occurring at Aspromonte (Calabria).

3269. Pauley, S. S., and Perry, T. O. **Ecotypic variation of the photoperiodic response in *Populus*.** *J. Arnold Arbor.* 35 (2), 1954 (167–88). 22 refs.

Studies were made on living Poplars representing different ranges of various species of this genus, in order to investigate the influence of the photoperiod on time of height-growth cessation. Marked variations in these times were observed in clonal lines of single species when grown in the same day-length régime and an otherwise uniform environment. Time of cessation was inversely correlated with the latitude of origin of each clone. Among clones originating in zones having the same day-length, the time at which height growth ceased was directly correlated with the length of the frost-free season of the native region. It can be concluded therefore that adaptation of *Populus* spp. to various habitats differing in the length of their frost-free season is brought about by a genetic mechanism that controls the duration of their seasonal growth. Modifications in time of height-growth cessation were brought about by exposing individuals of various clones to artificially lengthened or shortened photoperiods in otherwise uniform environments. Time of height growth cessation therefore seems to be the result of an interaction between the individual's genotype and the photoperiod. Other intra-clonal modifications were also observed in time of height-growth cessation which could not be attributed to photoperiodic response. Temperature differences, available N, intensity of cultivation and other factors also seem to exert a modifying influence. Hybrids between clones of northern and southern origin gave a photoperiodic response intermediate between the responses of the parents. Temperature rather than photoperiod seems to control the break of dormancy. [Cf. *For. Abstr.* 14 (No. 1953).]

3270. Rubner, K. Zur Frage der Entstehung der alpinen Lärchenrassen. **[The origin of races of alpine Larch.]** *Z. Forstgenet.* 3 (3), 1954 (49–51). 9 refs. [G.e.]

Three ecotypes of Larch are distinguished: (1) the quick-growing relict Larch of the lower alpine elevations, survival of the glacial period, and eminently suitable for afforestation outside its natural range; (2) the ecotype of the middle altitudes, lacking in specific characteristics, intermediate in growth rate and stem form, and susceptible to canker; and (3) the ecotype of the high alpine altitudes, a slow-growing tree, susceptible to canker and with inferior stem form.

3271. Schrötter, F. W. Frhr von. Über zwei Typen der Japanlärche (*Larix leptolepis* Gord.) in Schleswig-Holstein. **[Two types of *L. leptolepis* in Schleswig-Holstein.]** *Z. Forstgenet.* 3 (2), 1954 (33–8). 2 refs. [G.g.e.]

Among the 4,000 ha. of *L. leptolepis* grown in Schleswig-Holstein are stands planted 35–45 years ago, which contain types showing marked variations. The extremes of these types are termed by the author "grob-starr" (coarse - stiff) and "fein-weich" (fine - soft), the main characteristics of which are described.

3272. Matthews, J. D. **Japanese Larches at Dunkeld, Perthshire: a study in variation.** *For. Rec. For. Comm., Lond.* No. 25, 1954. pp. 23 + 9 photos. 17 refs. Price 2*s.*

The results of a detailed study of 11 Japanese Larches (*L. leptolepis*) at Dunkeld, raised from seed in 1884, and important as a source of the Dunkeld hybrid Larch, ×*L. eurolepis*, are set out and discussed. The trees vary strikingly in growth habit, date of flushing, size of leaves and cones and pubescence of shoots in their first year, but the differences are not such as to justify their being placed with any related species, e.g. *L. gmelini*.

3273. Schulenburg, A. Fr. Graf v.d. Die spättreibende Tieflandsfichte: eine gegen Spätfröste gefeite Klimarasse. **[The late-flushing lowland Spruce: a climatic race proof against late frosts.]** *Forstarchiv* 24 (8), 1953 (196–8). [G.]

In 1926 the author discovered in the Niederlausitz a ca. 185-year stand of Norway Spruce, of exceptionally high quality, which from its age must almost certainly have represented the local, native strain. Spruce of mountain provenance is badly damaged by late frosts in this region, and plantations raised from ordinary commercial seed in the neighbourhood of the old stand were clearly incapable of ever attaining the same high quality. Seed was later collected from the old stand, and the resulting seedlings were undamaged by late frosts. A second old stand was found later, but the fate of both old stands and any sowings of this strain in E. Germany is unknown. In 1937, however, a consignment of seed was sent to the Danish Forest Experiment Station, in whose trial plots the strain is still preserved. This Station has signified its willingness to make material available to forest geneticists in neighbouring countries.

3274. Slavin, B. H. **The Seneca hybrid Maple.** *Phytologia* 5 (1), 1954 (1). A.P.B.

A description of *Acer senecaensis*, a hybrid of *A. leucoderme* and *A. saccharum*.

166. *Economic Botany*

See also section 892.

3275. Dimitri, M. J., and Milano, V. A. Las plantas cultivadas en la República Argentina, Vol. IV, Fasc. 54. Fagáceas. **[Plants cultivated in Argentina, Vol. IV, Fasc. 54. Fagaceae.]** Instituto de Botánica, Ministerio de Agricultura y Ganadería, Buenos Aires. 1950. pp. 40. 17 refs. [Span.]

3276. Dimitri, M. J. Las plantas cultivadas en la República Argentina, Vol. V, Fasc. 73. Lardizabaláceas. **[Plants cultivated in Argentina, Vol. V, Fasc. 73. Lardizabalaceae.]** Instituto de Botánica, Ministerio de Agricultura y Ganadería, Buenos Aires. 1952. pp. 8. 12 refs. [Span.]

3277. Marzocca, A. Las plantas cultivadas en la República Argentina, Vol. V, Fasc. 77. Calicantáceas. **[Plants cultivated in Argentina, Vol. V, Fasc. 77. Calycanthaceae.]** Instituto de Botánica, Ministerio de Agricultura y Ganadería, Buenos Aires. 1952. pp. 13. 17 refs. [Span.]

3278. Milano, V. A., and Marzocca, A. Las plantas cultivadas en la República Argentina, Vol. VI, Fasc. 93$^{(1)}$. Rosáceas (I. Spiraeoideae). **[Plants cultivated in Argentina, Vol. VI, Fasc. 93$^{(1)}$. Rosaceae (I. Spiraeoideae).]** Instituto de Botánica, Ministerio de Agricultura y Ganadería, Buenos Aires. 1952. pp. 48. [Span.]

3279. Molinari, E. P. Las plantas cultivadas en la República Argentina, Vol. VIII, Fasc. 156. Plumbagináceas. **[Plants cultivated in Argentina, Vol. VIII, Fasc. 156. Plumbaginaceae.]** Instituto de Botánica, Ministerio de Agricultura y Ganadería, Buenos Aires. 1953. pp. 31. 11 refs. [Span.]

3280. Marzocca, A. Las plantas cultivadas en la República Argentina, Vol. VIII, Fasc. 158. Ebenáceas. **[Plants cultivated in Argentina, Vol. VIII, Fasc. 158. Ebenaceae.]** Instituto de Botánica, Ministerio de Agricultura y Ganadería, Buenos Aires. 1950. pp. 22. 45 refs. [Span.]

3281. Molinari, E. P. Las plantas cultivadas en la República Argentina, Vol. X, Fasc. 181. Valerianáceas. **[Plants cultivated in Argentina, Vol. X, Fasc. 181. Valerianaceae.]** Instituto de Botánica, Ministerio de Agricultura y Ganadería, Buenos Aires. 1952. pp. 11. 10 refs. [Span.]

168. *Histology*

See Nos. 3722, 3816, 4001 *et seq.*

17. SYSTEMATIC BOTANY

172.8. Eumycetes (True Fungi)

See Nos. 3710 *et seq.*, 4259 *et seq.*, 4379.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

See also Nos. 3275–81.

3282. Wyatt-Smith, J. **Manual of Malayan timber trees: 1. Burseraceae; 2. Leguminosae; 3. Myristicaceae.** *Res. Pamphl. For. Res. Inst. Kepong* Nos. 1–3, 1954. pp. 33 + 6 plates; 74 + 11 plates; 25 + 4 plates.

This new series (abbreviation in *For. Abstr.*: *Res. Pamphl. For. Res. Inst., Kepong*) is designed for the publication of material too technical for the *Malayan Forester* and still too fragmentary for a *Forest Record.* The first three pamphlets contain information on identification, distribution, native names, silvicultural characters, silviculture, and uses of the Burseraceae (*Canarium* spp., *Dacryodes* spp., *Santiria* spp., *Scutinanthe brunnea*, *Triomma malaccensis*), Leguminosae (*Adenanthera* spp., *Albizzia* spp., *Cassia* spp., *Crudia* spp., *Cynometra* spp., *Dialium* spp., *Enterolobium saman*, *Erythrina spp.*, *Intsia* spp., *Koompassia* spp., *Millettia* spp., *Ormosia* spp., *Parkia* spp., *Peltophorum* spp., *Pithecellobium* spp., *Pongamia* spp., *Pterocarpus indicus*, *Saraca* spp., *Sindora* spp., and *Tamarindus indica*) and Myristicaceae (*Gymnacranthera* spp., *Horsfieldia* spp., *Knema* spp., and *Myristica* spp.) with drawings of leaves, flowers and fruit.

3283. Hutchinson, J., and Dalziel, J. M. [Revised by Keay, R. W. J.] **Flora of tropical East Africa: Glossary of botanical terms, reprinted from *Flora of West Tropical Africa*.** Crown Agents for Overseas Governments, London. 1954. pp. 12. Price 9*d*.

3284. Turrill, W. B., and Milne-Redhead, E. **Flora of tropical East Africa: Chenopodiaceae.** Crown Agents for Oversea Governments and Administrations, London. 1954. pp. 26. Price 2*s*.

3285. Pardy, A. A. **Notes on indigenous trees and shrubs of Southern Rhodesia.** *Bull. Minist. Agric. Lds., S. Rhod.* Nos. 1731–3; 1741–3, 1953.

Each pp. 1 + 2 plates. (*Repr.* from *Rhod. agric. J.* 50 (5; 6), 1953 (365–7; 462–4).)

Kigelia pinnata, *Ficus capensis*, *Rhus lancea*, *Brachystegia tamarindoides*, *Sclerocarya caffra*, and *Strychnos cocculoides*.

3286. ARISTEGUIETA, L. Árboles de Venezuela. **[Trees of Venezuela.]** *Agric. venez.* 18 (165), 1953 (24–5 + 2 plates); 19 (166), 1954 (25–6). [Span.]

Pseudocassia spectabilis and *Hura crepitans*.

3287. LITTLE, E. L., JR. Los árboles de la Hacienda La Mucuy cerca de Mérida. **[The trees of La Mucuy near Merida.]** *Bol. Ingen. for. Univ. Los Andes* No. 2, 1954 (6–17). [Span.]

A list of species classified by families. [Cf. *For. Abstr.* 15 (No. 3407).]

3288. PULLE, A. [Editor]. **Flora of Suriname (Netherlands Guyana). Vol. 1, Part 2. Araceae, Pontederiaceae, Batidaceae.** *Meded. Inst. Trop. Amst.* No. 30 (*Afd. trop. Prod.* No. 11), 1953 pp. 92. [E.] Price *Fl.* 13.

3289. HILDEBRAND, F. H. Boomnamenlijst van Sumatra's westkust. **[List of tree species from the west coast of Sumatra.]** *Rapp. Bosbouwproefsta., Bogor* No. 64, 1953. pp. 69. [Jav.Du.E.]

The list is in two parts arranged (1) by native names and (2) under family, genus and species. Each part gives the local name, its language or dialect, scientific name, and durability class of the wood.

3290. HILDEBRAND, F. H. Boomnamenlijst van de Lampungs (Zuid-Sumatra). **[List of tree species from Lampong district (S. Sumatra).]** *Rapp. Bosbouwproefsta., Bogor* No. 65, 1954. pp. 29. [Jav.Du.E.]

The list is in two parts arranged (1) by local names and (2) under family, genus and species. Each gives the local name, its language or dialect, the scientific name, and durability class of the wood.

174.2. Gymnosperms

3291. BELL, P. R. **Conifers and their ancestors.** *Science Progress, London* 42 (165), 1954 (96–104). O.R.S.

A review of research published during 1951 and 1952 including data on new species, fossil plants, taxonomy, structure and growth, photoperiodic effects and wood properties.

3292. GUINIER, P. Structure du noyau quiescent de sept espèces de conifères. **[Structure of the resting nucleus of seven conifers.]** *C. R. Acad. Sci., Paris* 238 (3), 1954 (382–4). 1 ref. [F.f.]

Generic differences in structure may have a systematic and morphological value.

3293. TAKAHASHI, M. **[Larch and its silviculture in Japan.]** Tokyo Forestry Bureau, Meguro, Tokyo. 1943. pp. 9 + 268. 8 pp. of refs. [Jap.]

A detailed treatise with chapters on:—taxonomy, physiology, wood properties and utilization, the distribution, ecology and regeneration of natural forests, afforestation, site factors, genetical characteristics, seeds and seedlings, silvicultural operations, use in shelterbelts, growth statistics, disease and protection. An appendix gives stem-analysis data, and yield-table data for 3 quality classes (in one case up to 100 years, another 35, and the rest 60). The extensive bibliography is arranged under broad subject heads.

3294. KISSER, J. Vom Bau und Leben der Fichte. **[The structure and life of the Spruce.]** *Heraklith Rundschau, Radenthein* No. 26, 1953 (2–23). [G.]

A fully illustrated (53 photos) account of the physiology and ecology, wood properties and structure of *Picea abies*.

3295. CIUMAC, G. O forma de molid rar intâlnită. **[An unusual form of Spruce.]** *Rev. Pădurilor* 68 (5), 1953 (45–6). [Rum.rum.russ.]

Describes an example of *Picea abies* f. *virgata*.

3296. Pins d'Indochine. **[Pines of Indochina.]** *Bois For. Trop.* No. 35, 1954 (20–4). [F.]

Silvicultural characters, wood properties, and resin of *Pinus khasya* and *P. merkusii*.

3297. LITTLE, E. L., JR., and DORMAN, K. W. **Slash Pine (*Pinus elliottii*) including South Florida Slash Pine, nomenclature and description.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 36, 1954. pp. ii + 82. 8 pp. of refs.

[Cf. *For. Abstr.* 14 (No. 1976).] Includes a distribution map and a detailed study of the differences between the Slash Pine of the W. Indies and Central America (*P. caribaea*), and those of N. Florida (*P. elliottii* var. *elliottii*) and S. Florida (*P. elliottii* var. *densa*).

3298. FARRAR, J. L. **Variation in Jack Pine seedlings.** *Silv. Leafl. For. Br. Can.* No. 76, 1953. pp. 2.

Seedlings of *Pinus banksiana* are especially difficult to identify. The foliage often differs from that of the mature tree, environment has a strong effect on form, and other variations, possibly genetic in origin, are common. These points are illustrated by photographs.

176.1. Dicotyledons

See also Nos. 3274–81, 3336, 4010–5.

3299. PILÁT, A. Listnaté stromy a keře našich zahrad a parků. **[Broadleaved trees and shrubs of Czechoslovakian gardens and parks.]** Státní Zemědělské Nakladatelství, Prague. 1953. pp. 1100 + [3]. 4 pp. of refs. [Cz.] Price *Kčs.* 87.50.

A comprehensive manual, covering the woody monocotyledons as well as the dicotyledons to which the bulk of the work is devoted. The arrangement is by families [though no key to these is given] with keys to genera and species, the brief descriptions of the last being included in the keys. A special feature is the collection of 705 photos by the author, showing in most cases the general habit and in some others the foliage, flowers or fruit, of the more important species. There are indexes to Czech and Latin names, and a 22-page glossary of botanical terms.

3300. BROWICZ, K. Szkice dendrologiczne. **[Dendrological sketches.]** *Roczn. dendrol. polsk.*

Tow. bot. Warsz. 9, 1953 (239–52). 24 refs. [Pol.russ.e.]

Envisages the possibility of *Eucommia ulmoides* plantations in Poland. Describes experimental areas of *Carya ovata*, a fruit-bearing *Maclura pomifera*, and the occurrence of flat roots in *Ulmus laevis*.

3301. Miranda, F. Plantas nuevas o notables de la flora de Chiapas. **[New or noteworthy plants of the flora of Chiapas.]** *An. Inst. Biol. Univ. Méx.* 24 (1), 1953 (69–96). [Span.] C.G.B.

Includes a description of a new genus of the Sapindaceae, *Blomia*, with a single species, *B. cupanoides*; the genus is near *Cupania*, but is distinguished from it by the disposition of the radicle. Descriptions are also presented of the following new tree species: *Agonandra ovatifolia*, *Beilschmiedia riparia*, *Capparis speciosum* and *Acacia chaconensis*.

3302. Tsoong, P. C. **A new *Acer* from China.** *Kew Bull.* 1954 (1), (83).

A large tree, *A. miaotense* sp. nov., found in the Tsingling Range of Shensi province.

3303. Pichon, M. Classification des Apocynacées: XXXVI. Révision des Pléïocarpinées. **[Classification of the Apocynaceae: XXXVI. Revision of the Pleiocarpineae.]** *Bol. Soc. broteriana* (*Ser. 2*), 27, 1953 (73–153). 62 refs. [F.]

3304. Merrill, E. D. **Reductions in *Elaeocarpus*.** *Proceedings of the Royal Society of Queensland, Brisbane 1950* 62, 1952 (49–56). L.S.

Presents synonyms for 90 published names under *Elaeocarpus*.

3305. Smith, A. C. **Studies of Pacific Island plants XV. The genus *Elaeocarpus* in the New Hebrides, Fiji, Samoa and Tonga.** *Contr. U.S. nat. Herb.* 30 (5), 1953 (523–73). 5 refs. O.B.D.

3306. Krstić, M. Rapport sur le châtaignier en Yougoslavie. **[Report on *Castanea sativa* in Jugoslavia.]** [*Pap.*] *2^e Sess. Comm. int. Chât.* No. *FAO/CH/*9, 1953. pp. 4. [F.]

3307. Dumitriu-Tătăranu, I., and Ocskay, S. Schiţa monografica a fagilor din R.P.R. **[A note on the evolution of Beech in Rumania.]** *Rev. Pădurilor* 68 (5), 1953 (5–10). 13 refs. [Rum.rum.russ.]

Gives some palaeobotanical notes to explain the presence in Rumania, alongside *Fagus sylvatica*, of forms intermediate between that species, and *F. taurica*; and a key for the identification of these indigenous forms, of which the most important are *F.s.* var. *moesiaca* and *F.s.* var. *leucodermis*.

3308. Browicz, K. Dęby uprawiane w Polsce. (Opracowanie monograficzne). **[Oaks grown in Poland. (A monographic study).]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 9, 1953 (71–122). 15 refs. [Pol.russ.e.]

Gives a key to and descriptions of 29 *Quercus* species (3 of them native), 6 hybrids, and 39 varieties, so far known to occur in Poland, and classifies them provisionally into 3 groups: (1) hardy in central Poland, (2) worth trial for hardiness there, and (3) recommended for further trial in W. Poland only.

3309. Martinez, M. Los encinos de México. III. **[The Oaks of Mexico III.]** *An. Inst. Biol. Univ. Méx.* 24 (2), 1953 (237–71). [Span.] C.G.B.

[Cf. *For. Abstr.* 15 (No. 120).] Describes and gives the distribution in Mexico of 9 species, among them the new species, *Quercus sanchez-colini*.

3310. Martinez, M. Una nueva especie de *Quercus*. **[A new species of *Quercus* [*Q. mulleri*].]** *An. Inst. Biol. Univ. Méx.* 24 (1), 1953 (51–3). [Span.] C.G.B.

3311. Muller, C. H. Una nueva especie de *Quercus* de la Sierra Madre occidental de México. **[A new *Quercus* species [*Q. martinezi*] from the western Sierra Madre of Mexico.]** *An. Inst. Biol. Univ. Méx.* 24 (2), 1953 (273–7). [Span.] C.G.B.

3312. Evrard, C. Les Flacourtiaceae—Oncobeae au Congo Belge. **[The Oncobeae (Flacourtiaceae) of the Belgian Congo.]** *Bull. Soc. Bot. Belg.* 86 (1), 1953 (5–23). [F.] O.B.D.

A revision of the genera and species with notes on distribution and ecology. The tribe Oncobeae is retained with 2 subdivisions, Erythrosperminae and Oncobinae.

3313. Gorrie, R. M., and Worthington, T. B. **The identification of Australian Wattles (Acacias) introduced into Ceylon.** *Tea Quarterly, Talawakelle* 23 (3), 1953 (73–5). L.S.

About a dozen or more Acacias have been introduced at some time or other into the Ceylon highlands, as either shade or ornamental trees. It is probable that local hybrids have already been produced among the naturally regenerated stands now well established in the jungle fringes of Hakgala and the Nuwara Eliya golf course, and in the shrubby wild lands adjoining old established tea estates. A key is presented as a possible help in identification.

3314. Gardner, C. A. **Trees of Western Australia: the Dundas Mahogany; the Gungunnu; the Round-leaved Mallee.** *Leafl. Dep. Agric. W. Aust.* No. 2123, 1954. pp. 8. (*Repr.* from *Journal of Agriculture of Western Australia, Perth* 3 (1), 1954.)

3315. Santos, F. P. dos. Para uma mais fácil identificação de plantas novas em viveiro. **[Aid to an easier identification of young plants in the nursery.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 26–*C*9, 1954. pp. 25 + 2 plates. 9 refs. [Port.] Limited distribution.

The characteristics of the seeds and seedlings of 12 *Eucalyptus* species were studied, and are here set out with illustrations and a key for quick identification.

3316. Smith, L. S. ***Opisthiolepis*, a new genus of Proteaceae from Queensland.** *Proceedings of the Royal Society of Queensland, Brisbane 1950*, 62, 1952 (79–81 + 1 plate). 1 ref. L.S.

The genus resembles *Lamatia* in general structure, but is readily distinguished by the occurrence of a single hypogynous scale in the flower instead of 3 glands. The single species *O. heterophylla* is a medium to large rain-forest tree.

3317. Peace, T. R. **International code of nomenclature for cultivated plants.** *Rep. 7th Sess. int. Poplar Comm., Germany, May 1953,* 1954 (39–42).

3318. Guinier, P. **Nomenclature for Poplars: application of the decisions of the International Botanical Congress at Stockholm.** *Rep. 7th Sess. int. Poplar Comm., Germany, May 1953,* 1954 (37–8).

3319. **Proposals to improve identification and cultivation of Poplar in the Near East. Note of the Secretariat.** [*Paper*] *Near East Poplar Conference 1954, FAO, Rome FAO/NEPC/6,* 1954. pp. 17. [E.]

Includes a table showing native and introduced species at present cultivated in different Near Eastern countries, a few notes on the more important of these, and suggestions for breeding programmes, inventories, and attempts to straighten out taxonomic difficulties.

3320. **Near East Poplar policies and the problems involved in their implementation. Note of the Secretariat.** [*Paper*] *Near East Poplar Conference* 1954, *FAO, Rome* No. *FAO/NEPC/4,* 1954. pp. 8. [E.]

3321. Koltay, G. [Editor]. A nyárfa. [**The Poplar.**] Mezögazdasági Kiadó, Budapest. 1953. pp. 159 + 42 photos + 1 tbl. 29 refs. [Hung.]

A well illustrated handbook in 7 sections. (1) Botanical description. (2) Climatic and soil conditions, including analysis of 3 soil profiles (pp. 48–9) for stands of *P. alba, P. marilandica* and hybrid Poplar, and (p. 50) a table of salient soil requirements for several species; also the plant communities found on Poplar soils in Hungary. (3) Silviculture (propagation, planting out, tending, thinning etc.). (4) Tree breeding with special reference to Hungary. (5) Diseases and pests: protection. (6) Timber production. (7) Industrial uses. There is an index, bibliography (including 13 Hungarian references) and numerous photos.

3322. Laitakari, E. Poppeli—tulevaisuuden puu. [**Poplar—tree of the future.**] *Metsät. Aikak.* 1954 (1), (11–6). [Fi.e.]

Discusses the genus, its distribution, hybrids, site requirements, growth, utilization, breeding and research, and possibilities in Finland. Species and hybrids successful in Finland are discussed. *P. tremula* × *tremuloides* has given good results. The need to develop a form of *P. tremula* less subject to decay is stressed. *From author's summary.*

3323. Kobendza, R. Czym jest topola rogalińska? [**What is *Populus rogalinensis?***] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 9, 1953 (153–66). 3 refs. [Pol.russ.e.]

This tree, first described as a species by Wróblewski (1928) and subsequently as a variety of *P. canescens* by Bugała [see *For. Abstr.* 13 (No. 3627)] exists only in the ♀ sex and—like *P. fredroviensis* Wróbl.—should be referred to the complex of *P. alba* × *P. tremula* hybrids known as "*P. canescens* Sm.", though it is distinct from other variants of this complex in Poland. In 1950 the author crossed *P. rogalinensis* with a ♂ *P. canescens.* The 16 survivors out of a progeny of 40 seedlings are described individually, with drawings of their leaf-shapes. All differ, in varying degrees, from one another, from their immediate parents, and from *P. alba* and *P. tremula.*

3324. Wyatt-Smith, J. **The Malayan species of *Avicennia.*** *Malay. Forester* 17 (1), 1954 (21–5 + 5 photos + keys). 2 refs.

Distinguishes *A. alba, A. intermedia, A. lanata,* and *A. officinalis.*

18. PLANT ECOLOGY

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 3282, 3293, 3296, 3321–2, 3425, 3958, 3995.

3325. Svoboda, P. Lesní dřeviny a jejich porosty. Část I. [**Forest trees and their silvicultural characters. Pt. I.**] *Lesn. Knihovna* (*velká Řada*) No. 6, 1953. pp. 411 + 94 plates. Many refs. [Cz.] Price *Kčs.* 47.30.

Introductory chapters (pp. 5–80) deal in a general manner with the natural range of species, the nature of species and intraspecific variation, choice of parent trees for seed, and the influence of human activities (management, selection and breeding, and the introduction of exotics), with frequent reference to Russian genetical literature. These are followed by accounts, varying greatly in detail according to the state of knowledge, of individual species, arranged in two groups: (1) *Picea abies* (with *P. obovata*), *P. omorika, P. orientalis* and *P. schrenkiana*; *Abies alba* (with *A. cephalonica*), *A. nordmanniana* (with *A. bornmuelleriana* and *A. cilicica*), *A. pinsapo* (with *A. numidica*), and *A. sibirica*; *Pinus sylvestris, P. mugo, P. cembra, P. sibirica, P. koraiensis,* and *P. pumila*; *Larix decidua, L. sibirica,* and *L. gmelinii, Juniperus communis* and *J. sabina*; and *Taxus baccata.* (2) The Mediterranean species—*Pinus peuce, P. nigra* (with 4 subspecies), *P. heldreichii, P. pinaster, P. halepensis,* and *P. pinea*; *Cedrus patula* (*C. libani, C. atlantica* and *C. brevifolia*); *Cupressus sempervirens*; and *Juniperus* spp. Under each species information is given so far as possible under the standard heads: Common names in a variety of languages; general description; range and ecological characters in general; climatic ecotypes (often again subdivided, e.g. *Picea abies* is divided into a northern and a montane type, each subdivided into 6 regional ecotypes); intraspecific variation and hybrids, if any; history; stand development and cultivation. The nomenclature both of species and within species is said to be practical in intention and does not necessarily agree with that required by the botanical rules. There are many photographs, maps illustrating natural ranges, separate bibliographies for each genus (and, in some cases, species), and an index to scientific names and general topics. The work is to be completed in 3 parts [but contents of the succeeding parts are not indicated].

3326. Tillisch, E. Om *Abies grandis* og dens muligheder i dansk skovbrug. **[*Abies grandis* and its possibilities in Danish forestry.]** *Dansk Skovforen. Tidsskr.* 37 (4), 1952 (139–205). 22 refs. [Dan.e.]

A condensed version of a thesis, based partly on literature (mostly American) and partly on the author's own observations together with unpublished information from various persons or bodies, under the heads: botanical description, range and climatic factors, introduction into Europe, questions of provenance, cone-setting and seed, nursery problems, plantation trials, growth and development, injuries, wood properties, uses (including minor products), and the economics of planting. The little Danish experience to date suggests that growth may vary widely with provenance. Climatic considerations indicate the western slopes of the Cascade Mts. in Washington, the north-east of the Olympic Peninsula and the east of Vancouver Island as the most likely provenances to suit Danish conditions, and seed from the second of these has given the best results in 3-year trials. Seed is best sown in autumn or stored at ca. 0°C. with a moisture of ca. 6%: under such conditions imported seed has yielded up to 15,000 seedlings/kg. of seed, but Danish-grown seed considerably less. Seedlings are fit for planting out at 2 + 0 years in the open; shade is unfavourable and hence planting under shelterwood should be avoided. A mixture of 25% *A. grandis* with 75% Norway Spruce is said to be cheap and successful. *A. grandis* is tolerant as regards soil, but does particularly well on low-lying ground with a high water-table. Plots between 20 and 40 years old may have a c.a.i. of 36–38 cu.m./ha., and with heavy thinning, which seems to be advantageous economically, diameter growth is phenomenal. Wind resistance is about equal to that of Sitka Spruce. Frost damage to foliage is unimportant, though frost crack of the stems occurs fairly frequently. Danish plantations are healthy on the whole, but the species cannot be recommended for areas severely infected with *Armillaria mellea*, and *Phomopsis pseudotsugae* may occasionally be troublesome. The Statsprøveanstalt has tested 25 Danish-grown stems, from 5 stands on different sites, for static bending strength and compression (3 samples/tree) and oven-dry density (1 sample/tree). The wood is soft and light; slightly less strong, and with a density 20–30% lower, than Norway Spruce. According to Danish experience it is well suited for box shooks (especially for food containers) and for plywood. It can also be used for groundwood pulping, the pulp being less white than that of Norway Spruce but of equal strength. It is not suitable for the manufacture of matches or wood wool.

3327. Hueck, K. Distribuição e habitat natural do Pinheiro do Paraná (*Araucaria angustifolia*). **[Range and natural habitat of *A. angustifolia*.]** *Boletim, Faculdade de Filosofia, Ciências e Letras, Universidade de São Paulo* No. 156, 1953 (5–24). 28 refs. [Port.e.]

A study of range and ecology. In its natural habitat *Araucaria* is not receding, but rather advancing into the "campos" and savannas. The author draws attention to the large number of species of the Antarctic flora in the *Araucaria* forests.

3328. Couppis, T. A. **Some notes on the Mediterranean Cypress, *Cupressus sempervirens*, found in Cyprus.** *Emp. For. Rev.* 33 (1), 1954 (71–3).

The Mediterranean Cypress is next in importance as a forest tree to the Pines. It grows well along the northern range of mountains and is used extensively as a windbreak round orchards. The growth is slow, but it can be accelerated by irrigation, when a height growth of 7 ft. or more per annum is not uncommon. The species prefers calcareous soils, but it does well on any other type of soil providing it is deep and fresh. It is highly shade-tolerant and retains the branches for a very long time. Pruning is injurious because of the inability of the tree to occlude its wounds unless painted with some antiseptic. The species reproduces itself freely from seed, but also by coppicing if the stem is cut off above the lowest whorl of branches. The timber is durable, and is used extensively in building construction. *Author's summary.*

3329. Cianciulli, P. L. O pinheiro de Monterey—considerações sôbre o habitat do *Pinus radiata* D. Don. "Monterey Pine" e sua disseminação através dos continentes. **[Monterey Pine—notes on the habitat of *P. radiata* and its spread across the continents.]** *Publicação, Secretaria da Agricultura, São Paulo* No. 841, 1953. pp. 29. 18 refs. [Port.] (*Repr.* from *Boletim de Agricultura, São Paulo* 1951).

Information on *P. radiata* briefly presented, and including notes on its natural habitat, botanical characteristics, cultivation throughout the world, the afforestation plan of São Paulo, and the progress of the stands there.

3330. Kadambi, K. ***Dipterocarpus indicus*, Bedd. (syn. *D. turbinatus*, Gaertn. F.) its silviculture and management.** *Indian For.* 80 (5), 1954 (264–76 + 6 photos, 1 map). 36 ref.

Notes on ecology, silviculture, protection, increment and utilization.

3331. Koelmeyer, K. O. **Silvicultural notes on trees—Satin (*Chloroxylon swietenia* D.C.).** *Ceylon Forester* (*n.s.*) 1 (3), 1953 (59–67). 27 refs.

Botanical description, distribution, silvicultural characters, and brief notes on properties and uses of wood.

3332. Boudy, P. Monographies et traitements du chêne afarès et du chêne tauzin. **[Silvicultural characters and management of *Quercus castaneaefolia* and *Q. pyrenaica*.]** *Chêne-Liège* 60 (1488), 1954 (17...21). [F.]

3333. Boudy, P. Monographie et traitement du chêne kermès (*Quercus coccifera* L.). **[Silvicultural characters and treatment of *Q. coccifera*.]** *Chêne-Liège* 60 (1490), 1954 (23, 24). [F.]

3334. Philippis, A. de. Gli eucalitti visti in Australia. **[Eucalypts seen in Australia.]** Ente Nazionale per la Cellulosa e per la Carta, Rome. 1954. pp. 36 + 64 photos. 18 refs. [It.f.e.]

Discusses the ecology and possible extended uses elsewhere of Eucalypts, on the basis of observations made during the recent FAO study tour.

3335. RENIER, H. J. Les *Eucalyptus* en Australie et en Tasmanie: leur écologie et leur utilisation en rapport avec les possibilités d'introduction et de multiplication au Congo Belge et au Ruanda-Urundi. **[The Eucalypts in Australia and Tasmania: their ecology and their utilization, in relation to the possibility of their introduction and propagation in the Belgian Congo and Ruanda-Urundi.]** Direction d l'Agriculture, des Forêts et de l'Élevage, Brussels, 1953. pp. 126 + 155 photos + 15 maps. 147 refs. [F.]

The fruits of participation in the FAO *Eucalyptus* study tour. The climate and environment generally are described in some detail, together with the ecology of various associations and the utilization of individual species. Some scattered references are made to trials in the arboretum of Astrida (Ruanda).

3336. ALLEGRI, E. **A brief note on *Populus euphratica* Oliv. in Iraq.** [*Paper*] *Near East Poplar Conference 1954, FAO, Rome* No. *FAO/NEPC*/3 and 3 Add. 1, 1954. pp. 5 + 1. [E.]

Notes on silvicultural characters, with a botanical description.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 3269, 3273, 3291, 3355, 3359–60, 3365–7, 3440–4.

3337. ROUSSEL, L. Le sapin, essence d'ombre. **[Silver Fir, a shade-bearer.]** *Bull. Soc. for. Franche-Comté* 27 (1), 1954 (17–22). [F.]

Measurements were made of relative illumination (*r.i.*) and mean length of annual shoot of young Fir [*Abies alba*] trees (*a*) under mature Fir/Spruce and (*b*) under broadleaved coppice with standards. The following tenetative results were obtained: in the conditions of the experiment (*a*) under coniferous cover with 25% *r.i.*, the mean length and basal diameter of annual shoots of Fir were almost equal to those on trees grown in full light, but on north aspects of clearings with only 12% *r.i.* shoot development was markedly inferior. It appears that 25% *r.i.* is the maximum amount practicably utilizable by this species and that any increase is of no value to it. Below 25%, however, any diminution in *r.i.* reacts unfavourably on growth. In experiment (*b*) under deciduous cover, 3% *r.i.* in summer permitted growth equal to that in coniferous stands with at least double that amount of *r.i.* This is probably due to the diminished but still effective photosynthesis possible to the Fir in winter when the broadleaved stand is leafless. [Cf. *For. Abstr.* 15 (No. 3417).]

3338. BUGAŁA, W. Rodzaj *Aesculus* L.—kasztanowiec w Arboretum Kórnickim. **[The genus *Aesculus* in the arboretum of Kórnik (Poland).]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 9, 1953 (184–94). [Pol.russ.e.] 1 photo.

Notes on the 16 species and varieties grown, including their frost-hardiness.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 3185, 3190–3, 3216–21, 3241, 3246, 3252, 3300, 3356–8, 3417, 3487–9, 3543, 3857.

3339. DUVIGNEAUD, P. Remarques phytogéographiques sur la présence, au Katanga, de deux arbres du genre *Strychnos*. **[Notes on the phytogeographical significance of the presence, in Katanga, of two trees of the genus *Strychnos*.]** *Bull. Soc. Bot. Belg.* 86 (1), 1953 (105–12). 13 refs. [F.] O.B.D.

The occurrence of these—*Strychnos stuhlmannii* on termite mounds and *S. mitis* in the gallery forests and on the high plateaux of Katanga—illustrates clearly the varied character of the vegetation of this region. This wide range of plant elements is due to the great diversity of environments. Of these, termite mounds are the most specialized, offering maximum soil aridity with a maximum of fertility. The plateaux, which are much cooler, have preserved relicts of montane and even sub-alpine vegetation alongside species belonging to a warmer climate.

3340. KHAN, M. I.-U.-R. **Water relations of plants in arid regions.** *Emp. For. Rev.* 33 (2), 1954 (124–31). 28 refs.

Describes water relations under the heads of xerophyty and xeromorphy, water absorption, soil moisture, transpiration, root system, drought resistance, and water requirements and conservation, and reviews work (mainly American) from 1919 to 1952. [Cf. *For. Abstr.* 15 (Nos. 3207, 3394).]

3341. KARSCHON, R., and PRAAG, J. VAN. **[Growth of Red Gum as influenced by depth of hardpan.]** *La-Yaaran* 4 (1/2), 1954 (14–7, 38). 5 refs. [Heb.e.]

Investigations in Ilanoth forest, Israel, on more or less degraded red sandy soils show that growth of *Eucalyptus rostrata* is closely related to the soil, the main factor being the depth of the hardpan. Optimum growth was found with the hardpan at a depth of 1–1·5 m. Growth was poor on superficial hardpan, and plantings failed on sites where the hardpan was at considerable depth and covered with a thick layer of sand. The abundance of *Eragrostis bipinnata* was closely related to hardpan depth and may be used to evaluate the quality of the site for Red Gum. *From authors' summary.*

3342. WALKER, R. B.; KRUCKEBERG, A. R.; WHITTAKER, R. H. **The ecology of serpentine soils.** *Ecology* 35 (2), 1954 (258–88). 140 refs.

A symposium, consisting of 3 papers: (1) Factors affecting plant growth on serpentine soils; (2) Plant species in relation to serpentine soils; and (3) The vegetational response to serpentine soils. Serpentine vegetations appear in general to be characterized by apparent xeromorphism, reduction of structure towards the lower strata, and dominance of conifers (especially Pines) and sclerophyllous shrubs, and grasses.

3343. Mikola, P. Puulajin valinta. **[The choice of tree species.]** *Metsät. Aikak.* 1954 (2/3), (65–8). 9 refs. [Fi.e.]

The choice of species to maintain healthy humus conditions is discussed. Data on litter properties (acidity, ash and N content, and rate of decomposition) of different native trees and of ground vegetation species are tabulated. The growing of deciduous trees, even including weed trees, with conifers to accelerate litter decomposition is recommended. Thinning also improves humus conditions by promoting growth of herbaceous vegetation which in turn hampers the growth of *Hylocomium splendens* and produces a better, rapidly decomposing litter. *From author's summary.*

3344. Uchida, T., and Yamamoto, T. **[Studies on suitable sites for Todo Fir [*Abies mayriana*] in Hokkaido. (I) The soils of the Haboro region. (II) Soil changes caused by planting Todo Fir.]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (1–9). 13 refs. [Jap.e.]

3345. **[Failure of *Pinus radiata* on cut-over Wattle plantation.]** *Rep. Selwyn Plantat. Bd. 1952/53*, [1953] (5).

A cut-over Wattle plantation in New Zealand was planted with *P. radiata* in spring 1951, but survival was very poor in spite of good weather, except along the southern boundary where Wattles had not been growing. This is typical of what happens when trying to establish *P. radiata* after Wattle, which obviously impoverishes plains soil.

3346. Pachlewski, R. Badania mykotrofizmu siewek modrzewia polskiego i sudeckiego w naturalnych i sztucznych warunkach rozwoju. **[Mycotrophy of seedlings of *Larix polonica* and *L. sudetica* in natural and artificial conditions.]** *Acta Soc. Bot. Polon.* 22 (1), 1953 (133–68). 31 refs. [Pol.e.] O.B.D.

Well established mycorrhizae were found on well developed seedlings of *L. polonica* both in forest and nursery. Poorly developed *L. sudetica* in the nursery showed no, or poorly developed mycorrhizae, whereas healthy, self-sown forest seedlings of the same species had much better developed ectotrophic mycorrhizae.

3347. Dominik, T., and Nespiak, A. Badanie mykotrofizmu zespołów roślinnych krainy kosodrzewu w granitowych Tatrach. **[The mycotrophy of plant associations in the Dwarf Mountain Pine region of the High Tatra range.]** *Acta Soc. Bot. Polon.* 22 (4), 1953 (753–69). 4 refs. [Pol.g.] O.B.D.

About 90% of the mycotrophic species of this region are to be found on steep slopes with abundant swift watercourses. *Adenostyletum alliariae* exists in sheltered localities amongst boulders, where humus has accumulated over centuries. This association consists entirely of mycotrophic species. In the *Pinetum mugi* mycotrophy becomes rarer as the altitude increases. The amount of mycotrophy among the plant associations is not in proportion to the number of fruiting bodies found there. It is believed that type C of the ectotrophic mycorrhizae associated with *Pinus mugo* var. *pumilio* fixes free N and thus facilitates the growth of the tree on bare rock. In the Tatra Mountains, associations growing at the lower levels have a higher % of mycotrophic species. On *Banksia alpina* a well-formed endotrophic mycorrhiza of a tolypophagous type [digestion of hyphal balls] was found.

3348. Schmitt, D. M. **Early root development in Black Spruce (*Picea mariana*).** *Abstr. of thesis*, in *For. Chron.* 30 (1), 1954 (105).

3349. Honda, N., and Okazaki, M. **[Root development of Chestnut trees in relation to edaphic conditions (III). Observations made in Hirusen district (Ando-soil zone), Okayama Prefecture.]** *Scientific Reports of the Faculty of Agriculture, Okayama University, Okayama, Japan* No. 3, 1953 (8–21). 24 refs. [Jap.jap.e.]

The morphological character of the soils was studied in 4 physiographic sections, and observations were made on the root development of *Castanea crenata* at representative sites. [Results are shown in tables and figures with English legends.] *From authors' summary.*

3350. Cannon, W. A. **A note on the grouping of lateral roots.** *Ecology* 35 (2), 1954 (293–5). 5 refs.

Young trees of the seedling stage, 3 years old, may be branched to the 3rd order when growing under favourable conditions. The seedling stage may end with the formation of the ultimate order of laterals (the 5th order) or less. The sapling stage follows the seedling stage and may be characterized by the formation of specialized lateral roots of orders in being (as in *Quercus macrocarpa*). The sapling stage appears not to have a distinct ending, or the mature stage a distinct beginning. The ultimate order of the laterals is the same in both; when specialized laterals are present, as in *Q. macrocarpa*, they may constitute a large proportion of the root-bough of the old tree. *From author's summary.*

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See also Nos. 3377, 3425–6 3487, 3703.

3351. **[Fire-resistance of *Isoberlinia doka*.]** *Rep. For. Adm. Nth. Reg. Nigeria 1951/52*, [1952?] (12).

From investigations carried out at Zaria on the growth of *I. doka*, it appears that seedlings take many years to develop a woody stem. Seedlings burnt back to ground level by early fires when the leaves are nearly ready for shedding, immediately send up a new shoot indistinguishable from the original. The very small proportion of the young plant borne above ground appears to be an adaptation that enables it to tolerate being burnt back annually. [Cf. *For. Abstr.* 15 (No. 1158).]

181.5. Reproductive Behaviour

See also Nos. 3189, 3416 *et seq.*

3352. Brown, B. A., and Hansen, H. L. **Some observations of Speckled Alder [*Alnus rugosa***

var. *americana*] regeneration and growth habits. *Minn. For. Note* No. 27, 1954. pp. 2.

This brush species, with a dense network of roots, reproduces from seeds, coppice shoots, layers, underground stems and root suckers. Although initial invasion of a new area is dependent on seedlings, subsequent increase comes by vegetative means.

3353. KOBENDZA, R. Obserwacje nad biologią kwitnienia klonu srebrzystego (*Acer saccharinum* L.). **[Observations on the biology of flowering of *A. saccharinum*.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 9, 1953 (175–81). [Pol.russ.e.]

The species flowers in Warsaw early in April; ♀ flowers predominate. The seeds ripen in mid-May and can germinate late in May. The seedlings may attain a height of 50 cm. towards the end of the summer.

3354. HEBB, E. A. **Preservative treatment for paperboard seed traps.** *J. For.* 52 (4), 1954 (249).

Brushing with 5% pentachlorophenol in linseed oil extends the usefulness of these seed traps [cf. *For. Abst.* 13 (No. 1954)] at least through a second season.

3355. HOLMES, C. H. **Seed germination and seedling studies of timber trees of Ceylon.** *Ceylon Forester (n.s.)* 1 (3), 1954 (3–51). Many refs.

Includes: (1) tabulated data on germination tests of 86 species; (2) longer notes on germination and seedling development of 26 of the more important species, with literature references; (3) table of germination periods, and (4) relative light requirements of important species.

3356. SATOO, T., and GOO, M. **[Seed germination as affected by the suction force of soil and saccharose solutions.]** *Bull. Tokyo Univ. For.* No. 46, 1954 (159–68). 13 refs. [Jap.jap.e.]

The following results were obtained from a study of germination of seeds of *Cryptomeria japonica*, *Chamaecyparis obtusa* and *Pinus densiflora*: (1) On soils with low moisture contents, watering increased the germination % of *C. japonica* and *C. obtusa*, mulching increased that of *C. japonica*, and *P. densiflora* was not affected by either treatment. *C. japonica* is most and *P. densiflora* least sensitive to soil-moisture deficiency. (2) In controlled conditions, seeds of *C. obtusa*, *P. densiflora* and *P. thunbergii* germinated satisfactorily at soil moisture contents of 50% (ca. 8 atm. soil moisture tension) and over, but germination, especially of *C. obtusa*, decreased rapidly at lower moistures. (3) Suction force, determined by Buchinger's method, was *C. japonica* and *C. obtusa* 0·35 mol. (9.58 atm.), *P. densiflora* 0·40 mol. (11·1 atm.) and *P. thunbergii* 0·45 mol. (12·7 atm.). Germination decreased rapidly beyond certain concentrations, differing with the species: *C. japonica* 0·25 mol., *C. obtusa* 0·30 mol., *P. densiflora* 0·25 mol. and *P. thunbergii* 0·40 mol. (4) The amount of water absorbed from saccharose solutions of various concentrations was determined by weighing individual seeds at intervals in a torsion balance. Seeds of all 4 species failed to absorb enough water for germination from solutions over 0·75 mol. in concentration, and the amount of water absorbed decreased with increasing concentration. *From authors' summary.*

3357. NEGISI, K., and SATOO, T. **[The effect of soil drying on apparent photosynthesis, transpiration, carbohydrate reserves and growth of seedlings of Akamatsu. (*Pinus densiflora*).]** *J. Jap. For. Soc.* 36 (3), 1954 (66–71). 22 refs. [Jap.e.]

One-year-old seedlings in pots were subjected to gradual drying-out of the soil once or twice during the summer of 1952 while the soil moisture in pots with controls was kept as close as possible to field conditions. The rates of apparent photosynthesis and transpiration were reduced by soil-moisture deficiencies but were also related to air humidity. Apparent photosynthesis and transpiration reached the same comparative rate as the controls soon after the seedlings were watered. The % of carbohydrate reserves of test seedlings was slightly above that of controls immediately after treatment but the differences decreased by early spring 1953. The rate of diameter growth was considerably lowered during the period when the soil was dry but was higher for the test seedlings than for the controls after treatment. There was no obvious effect on growth in 1953. [Results are shown in tables and graphs with English legends.] *From authors' summary.*

3358. NEGISI, K., and SATOO, T. **[Influence of soil moisture on photosynthesis and respiration of seedlings of Akamatsu (*Pinus densiflora*) and Sugi (*Cryptomeria japonica*).]** *J. Jap. For. Soc.* 36 (4), 1954 (113–7). 6 refs. [Jap.e.]

Controlled experiments were made on 1-year seedlings in an insulated box [shown in a diagram with English legends] held at a constant temperature of ca. 30° C. and relative humidity of 65% with light intensity (1) constant at 45,000 lux, or (2) at levels of 75,000, 45,000, 15,000 or 7,500 lux. Results given in graphs [with English legends] show for Sugi at first an increase in apparent photosynthesis with decrease in soil moisture followed by a rapid decrease as soil moisture fell still further and for Akamastu a decrease in photosynthesis immediately soil moisture fell below field capacity, but a generally less rapid rate of decrease than for Sugi. There was no obvious relation between soil moisture and respiration. The higher the light intensity the greater the effect of decreasing soil moisture. *From authors' summary.*

3359. HASEGAWA, M., and FURUKAWA, T. **[The germination in light of forest tree seed. (1) Differences in germination between seed of Kuromatsu (*Pinus thunbergii*) and Akamatsu (*P. densiflora*).]** *J. Jap. For. Soc.* 35 (12), 1953 (382–4). 7 refs. [Jap.jap.e.]

P. thunbergii seeds showed a greater sensitivity to 20 mins. exposure to 100-lux intensity light, 24 hr. after soaking; germination 2 weeks after soaking was 66·5 as against 15·5% for *P. densiflora*. When the seeds were exposed to continuous light for 4 weeks, germination of *P. densiflora* was also much the slower. Seeds of *P. thunbergii*, however, kept at 1°C. for 5 days failed to germinate unless exposed to light, whereas germination of *P. densiflora* after low-temperature treatment alone was 56% after 3 weeks. *From authors' summary.*

3360. Ono, K. **[Studies on the effect of light on the germination of Japanese Cypress (*Chamaecyparis obtusa*) seeds.]** *J. Jap. For. Soc.* 36 (4), 1954 (89–92). 12 refs. [Jap.jap.e.]

Experiments using 100 luxes of artificial light showed that such exposure favours the germination of *C. obtusa* and that the light sensitivity of the seeds varies with provenance. Initial germination is low but increases rapidly with exposure to light for up to 24 hr. This increase is directly proportional to the period of pre-soaking in distilled water in the dark before exposure, the maximum being 11 hours pre-soaking. A very short period of exposure to light is enough to promote germination. *From author's summary.*

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 3417, 3573–5.

3361. Burbidge, N. T. **The significance of the mallee habit in *Eucalyptus*.** *Proceedings of the Royal Society of Queensland, Brisbane 1950* 62, 1952 (73–8). 13 refs. L.S.

In *Eucalyptus* there exist 3 main categories of form: (1) trees, (2) mallees, in which woody stems with scanty foliage arise from an underground woody stock, and (3) shrub-like plants, in which the woody stock is absent or poorly developed, commonly called marlocks in W. Australia. The mallee ecological association is characteristic of the drier parts of the winter-rainfall belt. Morphological and chemical evidence show that the mallee form represents a secondary development in *Eucalyptus*. The author suggests that a large number of mallees and marlocks developed as a direct result of the climatic change at the end of the Pleistocene. The chief centre of development for species most conspicuous in the mallee association is the Southern Eremaea in W. Australia. The migratory routes of certain birds may have been associated with the migration of the main species to the eastern parts of Australia.

3362. Burger, H. Holz, Blattmenge und Zuwachs. XII. Mitteilung. Fichten im Plenterwald. **[Wood, quantity of foliage and increment. XII. Spruce in selection forest.]** *Mitt. schweiz. Anst. forstl. Versuchw.* 28, 1952 (109–56). 44 refs. [G.]

Based on 60 trees and 1560 bole sections, the data are tabulated and graphed as in the preceding studies [cf. *For. Abstr.* 15 (No. 2347)] under: (1) wood properties, (2) crown and foliage in relation to increment in individual trees, (3) crown and increment relations in stands, examples being drawn for these last from pure Spruce and from Spruce/Fir forest.

181.8. Phenology

See also Nos. 3240, 3248, 3269, 3272–3, 3291, 3903.

3363. Krishnaswamy, V. S., and Mathauda, G. S. **Phenological behaviour of a few forest species at New Forest, Dehra Dun.** *Indian For.* 80 (3; 4), 1954 (124–53; 187–206). 8 refs.

An investigation of the phenological behaviour of some tree species growing at Dehra Dun was initiated in 1928. Work has been concluded on 17 species and the data analysed, and the results are here given in graphs and tables. The characters investigated were renewal of leaves, leaf fall, deciduous or evergreen habit, and availability of ripe fruit or seeds. The species dealt with are *Acacia catechu, Albizzia procera, Bombax malabaricum, Broussonetia papyrifera, Butea frondosa, Cedrela toona, Celtis tetrandra, Dalbergia latifolia, D. sissoo, Eugenia jambolana, Gmelina arborea, Mangifera indica, Ougeinia dalbergioides, Pinus longifolia, Shorea robusta, Tectona grandis* and *Terminalia tomentosa.*

3364. Doorenbos, J. **Review of the literature on dormancy in buds of woody plants.** *Meded. LandbHogesch., Wageningen* 53 (1), 1953 (1–24). 8 pp. of refs. [E.e.] Price *Fl.* 1.10.

The references are worldwide.

3365. Oksbjerg, E. Om udspringstid og skudstrækning i grankulturer. **[Date of flushing and shoot growth in Norway Spruce plantations.]** *Hedeselsk. Tidsskr.* 75 (3), 1954 (49–55). 10 refs. [Dan.] C.G.B.

The following results were obtained from 3 sets of measurements on 10- to 20-year-old early- and late-flushing Spruce: (1) the date of flushing and the length of the growth period vary considerably in individuals, especially in cool springs, when the difference in flushing date may be as much as 3–4 weeks, as against 10–12 days in warm springs; (2) shoot growth of late-flushing Spruce continues longer than that of early-flushing Spruce, and the growth period is somewhat longer; (3) the growth period is shorter in a warm summer; (4) a long terminal shoot usually indicates a long growth period, but exceptionally a long top shoot may be produced in a short growth period. In plots treated with N both growth period and top shoots were longer than on control plots. In plots containing 500 plants each of early- and late-flushing Spruce planted out in 1951 as 2 + 1 plants, 310 of the early-flushing Spruce were seriously damaged and 165 of the late-flushing ones moderately damaged by frost in May, 1952. [Cf. *For. Abstr.* 14 (No. 2036); 15 (No. 3273).]

3366. Wareing, P. F. **Growth studies in woody species. VI. The locus of photoperiodic perception in relation to dormancy.** *Physiol. Plant., Copenhagen* 7 (2), 1954 (261–77). 20 refs. [E.e.]

Seedlings of various woody species were induced to form resting buds by short-day treatment and then transferred to continuous illumination. Seedlings of *Betula pubescens*, *Larix decidua* and *Fagus sylvatica* expanded their buds and resumed extension growth under this treatment; those of *Acer pseudoplatanus* and *Robinia pseudoacacia* remained dormant. In order to bring about resumption of growth in dormant, leafy seedlings of *B. pubescens*, both buds and leaves must be exposed to continuous illumination; exposure of the leaves alone is ineffective. If, on the other hand, the leaves are maintained under short-day conditions, normal expansion of the buds does not occur when the latter are exposed to continuous illumination. Requirements for the production of lammas shoots by seedlings of *Q. robur* are similar. In actively-growing seedlings of *B. pubescens* the response of the apical 'bud' is (under certain experimental conditions) directly controlled by the photoperiodic régime to which it is exposed, regardless of the day-length conditions under which the leaves are maintained. There is thus direct photoperiodic perception at the shoot apex in *B. pubescens*. By contrast, in actively growing seedlings of *A. pseudoplatanus* and *R. pseudoacacia* the response of the shoot apex is determined by the day-length conditions to which the mature leaves are exposed. In these species, therefore, photoperiodic perception is primarily mediated through the mature leaves. It is postulated that a growth inhibitor is produced by the leaves during long dark periods, and that the effect of exposing the leaves to continuous illumination is to suppress the production of this inhibitor. The same photoreaction appears to be involved in photoperiodic perception both in mature leaves and in meristematic tissue of the buds. *From author's summary*.

3367. Leibundgut, H. Zur Phänologie der Laubbäume, insbesondere der Buche. 2. Mitteilung. **[The phenology of broadleaved trees, particularly of Beech. Part 2.]** *Schweiz. Z. Forstw.* 105 (5/6), 1954 (296–302). [G.]

Experiments were made to test the effect of normal and long-day light treatment on flushing of (1) "light" [open-grown] and (2) "shade" [shade-grown] Beech. The material was 2-year-old natural regeneration, 72 plants each of (1) and (2), brought into the laboratory and subjected to different day-lengths. On each sixth plant in each group, some buds were coated with chalk (*a*), others with animal charcoal (*b*), and others untreated (*c*). The increased day-length significantly accelerated all stages of flushing in "light" Beech; the reaction of "shade" Beech was much less, and was not significant in the earliest stage. The object of the treatments (*a*) and (*b*) was to determine the heat effect of the illumination; (*b*) had more effect than (*a*); both retarded flushing in (1) but not in (2). It is concluded that the differences between the two types of Beech are very complex and probably represent a mixture of genetic and environmental factors. [Cf. *For. Abstr.* 13 (No. 2849).]

181.9. Miscellaneous [including Ecological Role after Death of Plants or Parts of Plants (but for Litter, see Section 114.3)]

See Nos. 3222, 3229.

182. *Synecology, Plant Sociology: General, Principles and Methods*

182.1. Palaeoecology. History of Vegetation

See also No. 3361.

3368. Craig, H. **Carbon-13 variations in *Sequoia* rings and the atmosphere.** *Science* 119 (3083), 1954 (141–3). 13 refs. [University of Chicago.] O.R.S.

Isotopic analyses were made on the variation of C^{13} concentration in annual rings of *S. gigantea* from 1072 B.C. to A.D. 1649. The variations are extremely small and show no systematic trend with time except for the first 150 years of growth where a steady increase in concentration is observable. It is concluded that the variations are more probably due to effects of varying external conditions on the assimilation and respiratory processes of the tree than to atmospheric changes.

3369. Oberdorfer, E., and Lang, G. Waldstandorte und Waldgeschichte der Ostabdachung des Südschwarzwaldes. **[Forest sites and forest history of the eastern slope of the southern Schwarzwald.]** *Allg. Forst- u. Jagdztg.* 124 (6), 1953 (169–72). 7 refs. [G.]

Deals briefly with the present soils and forest vegetation—ranging from podzolic brown earth carrying Norway Spruce/Silver Fir with some Beech (*Piceeto-Luzuletum*) to bogland with Scots Pine (*Pineto-Vaccinietum uliginosi*)—of the Friedenweiler forest district, and in more detail with the forest history inferred from pollen analyses of 3 peat profiles. Concludes chiefly that the present dominance of Spruce over ca. ⅔ of the area is of recent origin and has been to a large extent artificially promoted by man. Though the climate has favoured succession to bog since quite early times, the *Sphagnum* spp. found in the Spruce/Fir forest are not markedly bog-forming, and here, especially, Fir is still worth encouraging.

3370. Meyer, K. A. Frühere Verbreitung der Holzarten und einstige Waldgrenze im Kanton Wallis. III. Im Rhoneknie und Landschaften des rechten Rhoneufers vom Mont Rosel bis Eggerberg. **[Former distribution of tree species and former timberline in the Canton of Valais. III. The Rhone knee and the country on its right bank from Mont Rosel to Eggerberg.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 28, 1952 (157–208). 10 refs. [G.f.]

Cf. *For. Abstr.* 12 (No. 2576).

3371. Dale, I. R. **Forest spread and climatic change in Uganda during the Christian era.** *Emp. For. Rev.* 33 (1), 1954 (23–9). 16 refs.

An attempt is made to deduce the extent and spread of Uganda forests during the past 2000 years from climatic, historical and forest evidence.

3372. Chaney, R. W. **A new Pine [*Pinus clementsii*] from the cretaceous of Minnesota and its palaeoecological significance.** *Ecology* 35 (2), 1954 (145–51). 14 refs.

Close similarity to *P. resinosa* is established by comparison of both cones and needles.

3373. Heusser, C. J. **Additional pollen profiles from southeastern Alaska.** *Amer. J. Sci.* 252 (2), 1954 (106–19). 14 refs. O.R.S.

Cf. *For. Abstr.* 14 (No. 1057).

3374. Calder, M. G. **A coniferous petrified forest in Patagonia.** *Bulletin of the British Museum (Natural History): Geology* 2 (2), 1953 (97–138 + 7 plates). 3 pp. of refs. Price 12*s*. O.R.S.

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 3183, 3386–9, 3402.

3375. Wyatt-Smith, J. **Storm forest in Kelantan**. *Malay. Forester* 17 (1), 1954 (5–11). 3 refs.

Tabulates and discusses data from a half-acre transect in forest believed to have originated after severe hurricane damage 70 years ago. A striking feature is the few species of Dipterocarps present and the uniform dominance of *Shorea parvifolia*, which has also been observed to dominate stands following clear cutting. [Cf. *For. Abstr.* 11 (No. 146).]

3376. Webber, M. L. **The Mangrove ancestry of a freshwater swamp forest suggested by its diatom flora**. *Malay. Forester* 17 (1), 1954 (25–6 + plate).

Examination of diatoms in the peat soil of a freshwater swamp forest 4 miles from a tidal river showed that they were all of marine origin and recent, and many species were the same as those found in an existing Mangrove swamp at Port Swettenham. It appears that the swamp must have been a Mangrove swamp in the comparatively recent past.

3377. Dawkins, H. C. **Timu, and the vanishing forests of Northeast Karamoja**. *E. Afr. agric. J.* 19 (3), 1954 (164–7). 3 refs.

The ecological balance between the closed forests (Juniper/Brown Olive, and *Acacia/Euphorbia*/Olive) and the wooded grassland (*Themeda/Hyparrhenia/Acacia/Cassia*/other spp.) is discussed with reference to fire, grazing and soil compaction.

3378. **[Succession of *Khaya grandifoliola*]**. *Rep. For. Adm. Nth. Reg., Nigeria 1951/52*, [1952?] (8).

Saplings of *K. grandifoliola* are more often found on the verge of the high forest than in the denser forest, which seems to indicate that this species comes in as the high forest invades savanna.

182.3. Units of Vegetation (Associations etc.)

3379. Reichling, L. Réflexions sur un perfectionnement possible du système phytosociologique et sur l'introduction d'une nomenclature binaire en phytosociologie. **[A possible improvement in the system of plant sociology and the introduction of a binomial system of nomenclature.]** *Rec. Lab. Bot. Univ. Montpellier* (*Sér. bot.*) No. 6, 1953 (169–72). [F.]

Suggests the adoption of the term *tribe* to be intermediate between the *alliance* and *association* and to be further defined by an epithet—geographical, specific etc.—to represent the association.

3380. Molinier, R. La hêtraie sans hêtre et l'étage du hêtre sans hêtraie. **[The *Fagetum* without *Fagus* and the Beech stage without Beech wood.]** *Rev. for. franç.* 6 (3), 1954 (145–50 + 1 photo). [F.]

The writer would go further than M. Gaussen, who objects to the use by ecologists of such terms as *Fagetum* for an association without any Beech trees in it, and objects to the use (e.g. by Gaussen on a vegetation map) of such terms as "Beech stage" for land with no trees on it, but which is theoretically suited to them or has ground vegetation characteristic of them. [Cf. *For. Abstr.* 15 (No. 1205).]

182.5. Synecological Measurements and Methods

See also Nos. 3873–4.

3381. Khan, M. A. W. **Sliced maps**. *Indian For.* 80 (2), 1954 (103–16). 23 refs.

Discusses (1) the standard symbols used for stock-mapping in India to represent the most important species and associations, and (2) the use of a base map with 2–3 overlays on tracing paper for mapping the different strata of vegetation e.g. overstorey, middle storey, and ground vegetation.

187. *Vegetation Types*

See also Nos. 3182–4, 3204–6, 3339, 3342, 3347, 3375–8, 3415.

3382. **Forest cover types of North America (exclusive of Mexico)**. Society of American Foresters, Washington. 1954. pp. 68. Price $1.00.

A revision (now including Canadian types) of the two bulletins previously published separately for the eastern and western United States [cf. *For. Abstr.* 8 (No. 1662).]

3383. Oosting, H. J. **Ecological processes and vegetation of the maritime strand in the southeastern United States**. *Bot. Rev.* 20 (4), 1954 (226–62). 62 refs.

3384. Sarvas, R. Pohjois-suomen kuivien kangasmetsien ekologiasta. **[On the ecology of dry moss/lichen forests in North Finland.]** *Prepr.* from *Commun. Inst. for. Fenn.* 41 (1), 1952. pp. 27. 79 refs. [Fi.e.]

From a study of vegetation on different forest types in northern and southern Finland, both from his own observations and from the literature, the author concludes that temperature rather than water supply is the principal factor responsible for the typically xeromorphic vegetation of the moss/lichen forests of N. Finland, and that these forests should be classified as "cold" rather than "dry".

3385. Duchaufour, P., and Millischer, H. Étude des types de végétation dans une sapinière vosgienne. **[A study of vegetation types in a Silver Fir stand in the Vosges.]** *Rev. for. franç.* 6 (3), 1954 (160–78 + 5 photos + 1 map). 3 refs. [F.]

The practical applications of the study are discussed, and stress is laid on the importance of obtaining regeneration rapidly and not leaving the soil uncovered and open to invasion by *Vaccinium*.

3386. Quézel, P., and Granel de Solignac, L. À propos de la régénération des futaies de chênes pubescents et de hêtres dans le zone méridionale des Causses. **[Regeneration of Oak (*Quercus pubescens*) and Beech in the southern zone of the Causses [calcareous plateaux of the Cevennes].]** *Rec. Lab. Bot. Univ. Montpellier* (*Sér. bot.*) No. 6, 1953 (149–67). [F.]

A study of succession on felled woodland of 3 types: *Coryleto-Galanthetum*, *Buxeto-Fagetum* and *Querceto-Buxetum*, with particular reference to the change in microclimate caused by the removal of tree canopy.

3387. BRINGER, L. La végétation actuelle des Bois de Doscares et de Grammont (derniers restes de la Forêt d'Aigremont). **[The present vegetation of the woods of Doscares and Grammont (last relics of the Forest of Aigremont).]** *Rec. Lab. Bot. Univ. Montpellier* (*Sér. bot.*) No. 6, 1953 (3–18). 14 refs. [F.]

This relict vegetation consists partly of *Lavandula stoechas* lande and mixed evergreen Oak wood (*Quercetum ilicis pubescentetosum*).

3388. PONS, A. Le repeuplement végétal sur les anciennes cultures de la région du Grand Luberon (Vaucluse). **[Succession on abandoned fields in the region of Grand Luberon (Vaucluse).]** *Rec. Lab. Bot. Univ. Montpellier* (*Sér. bot.*) No. 6, 1953 (135–47). 13 refs. [F.]

Studies the stages of succession, through annuals to Lavender and Rosemary garigue, of abandoned cultivation on what was originally *Quercetum ilicis*. The garigue stage may apparently prevent the development of the natural climax and itself form a "microclimax" corresponding to the local microclimate.

3389. GALOUX, A. La chênaie sessiliflore de Haute Campine: essai de biosociologie. **[The *Quercus sessiliflora* association of the Haute Campine: an essay in biosociology.]** *Trav. Sta. Rech. Groenendaal* (*Sér. A.*) No. 8, 1953. pp. 235 + 10 plates. 15 pages of refs. [F.]

A detailed study of the ecology of these Oak woods, including climate, soils, soil biology, regression to *Calluna* heath, the effect of recent planting with Pine and with broadleaved species. Particular stress is laid on the dynamic role of the soil and the soil fauna.

3390. MOOR, M. Die *Fagion*-Gesellschaften (Buchen-, Tannen-Buchen- und Ahornwälder) im Schweizer Jura. **[The *Fagion* associations (Beech, Beech/Fir, and Maple) in the Swiss Jura.]** *Beiträge zur Geobotanischen Landesaufnahme der Schweiz, Bern* No. 31, 1952. pp. 201 + 10 plates + 13 tbls. 73 refs. [G.g.f.]

A detailed ecological study of the *Cariceto-Fagetum*, *Fagetum silvaticae*, *Abieto-Fagetum* and *Acereto-Fagetum*.

3391. QUÉZEL, P. Contribution à l'étude phytosociologique et géobotanique de la Sierra Nevada. **[A plant-sociological and geobotanical study of the Sierra Nevada.]** *Mem. Soc. broteriana* 9, 1953 (5–77 + 9 photos). 30 refs. [F.]

3392. FERNANDEZ DE CORDOBA, L. C. Macaronesia—consideraciones sobre su flora y vegetación forestal. **[Macaronesia—its flora and forests.]** Escuela Especial de Ingenieros de Montes, Madrid. 1953. pp. 38. [Span.]

Notes on the climate and vegetation of the Azores, Madeira, Canary and Cape Verde Islands.

3393. SUZUKI, T., and USUI, H. **[The secondary forest vegetation of North Kanto district.]** *J. Jap. For. Soc.* 35 (1), 1953 (9–13). 11 refs. [Jap.e.]

An account of the vegetation in the intermediate zone between cool-temperate Beech climax and warm-temperate broadleaved evergreen climax.

3394. KHAN, M. I.-U.-R. **Forestry in subtropical dry regions of the world.** *Pakistan J. For.* 4 (1), 1954 (3–17 + map). 31 refs.

Cf. *For. Abstr.* 15 (Nos. 3207, 3340).

3395. DEBAZAC, P., GUINOCHET, M., and MOLINIER, R. Note sur les groupements climaciques de la Kroumirie orientale. **[Note on the climax associations of eastern Kroumirie [Tunisia].]** *Bull. Soc. bot. France* 99 (10), 1952 (28–32). [F.] O.B.D.

3396. CHAMPION, H. G. **Further notes [on "The Tropical Rain Forest" by P. W. Richards].** *Emp. For. Rev.* 33 (2), 1954 (134–5).

Cf. *For. Abstr.* 14 (No. 211).

3397. ROSAYRO, R. A. DE. **A reconnaissance of Sinharaja rain forest.** *Ceylon Forester* (*n.s.*) 1 (3), 1953 (68–74). 9 refs.

The Sinharaja group of forests lying in the south-west part of Ceylon has long been considered the only primeval rain forest left in Ceylon. Recent reconnaissances have been made on foot and by air by officers of the Forest Department, the results of which are briefly described. The region is classified into three main zones:—(1) the valleys and lower slopes, ca. 300 to 1500 ft; (2) the middle slopes, ca. 1500 to 2500 ft.; (3) the upper slopes and ridge tops, ca. 2500 to 4500 ft. Zone (1), observed to have been originally rich in *Dipterocarpus zeylanicus* and *D. hispidus*, has been profoundly altered by repeated shifting cultivation to scrub and fernland. Zone (2) is typical high forest of the *Mesua-Doona-*(*Shorea*) climax with *Dipterocarpus* locally dominant. Zone (3) is bordering on the stunted wet evergreen forest typical of the montane zone. From ecological considerations of the vegetation, it is held that Sinharaja is by no means a unique rain forest, but typical rather of the general wet evergreen forest type found in Ceylon. Other forests in Ceylon characterized by the *Mesua-Doona-*(*Shorea*) community should also be considered as true primeval forest, whose character may however have been somewhat altered by recent exploitation. *From author's summary.*

3398. KEAY, R. W. J. **An outline of Nigerian vegetation.** Government Printer, Lagos, and Crown Agents for Oversea Governments and Administrations, London. 2nd ed., 1953. pp. 55 + map. 108 refs. Price 5*s.*

Only brief additions and slight alterations have been made to the first edition [cf. *For. Abstr.* 11 (No. 1671).]

3399. PERRIER DE LA BATHIE, H. La mangrove (palétuviers) de Madagascar. Biologie et utilité. **[The Mangroves of Madagascar. Biology and utility.]** *Rev. int. Bot. appl. Agric. trop.* 33 (373/374), 1953 (581–2). P.R.

Describes the 6 species, *Rhizophora mucronata*, *Ceriops boviniana*, *Bruguieria gymnorhiza*, *Sonneratia alba*, *Carapa obovata* and *Avicennia officinalis*. They are exploited mainly for tanstuffs, but form a useful timber reserve.

3400. WYATT-SMITH, J. **Forest types in the Federation of Malaya.** *Malay. Forester* 17 (2), 1954 (83–4).

A tabulated statement of the acreage of (1) Mangrove forest, (2) freshwater swamp forest, (3) exploitable lowland forest, (4) at present unexploitable hill forest, (5) potential productive lowlands, and (6) permanently unproductive, in (*a*) forest reserves, (*b*) State forests, by states.

3401. RICHARDS, P. W. **[Review of *D. B. Fanshawe* "The vegetation of British Guiana: a preliminary review".]** *New Phytol.* 53 (1), 1954 (164). [See *For Abstr.* 14 (No. 212).] O.R.S.

3402. LAMPRECHT, H. Estudios selviculturales en los bosques del Valle de la Mucuy, cerca de Mérida. **[Silvicultural studies in the forests of the Mucuy Valley around Merida.]** Facultad de Ingeniería forestal, Universidad de Los Andes, Merida. 1954. pp. 130. 30 refs. [Span.span.e.]

The evergreen mixed rain forest of the high Andes, although it approaches the "cloud forest" of Beard, or the "tropical mountain rain forest" and the "tropical cloud forest" of Francke, cannot be fitted accurately into any of these categories. The forests here described are therefore designated by the author "high mountain cloud forest". In the climax forests two types can be distinguished (1) mixed forest, at ca. 2300–2600 m. and (2) Pino Aparrado (*Podocarpus oleifolius*) forest at ca. 2800–3200 m. The composition of these is described. There also exists secondary forest, i.e. formations that have undergone considerable changes in structure and composition due to direct or indirect human influence. Some of the most important species of all types are described and illustrated. Natural regeneration goes on almost uninterruptedly in the primary forest. In the secondary forest herbaceous formations dominated by Bamboo follow the first clearance. These are followed by rapid-growing, light-demanding species under whose cover the species of the primary forest gradually regain lost ground. No scientific studies have been made of the properties of timbers of this region, but many are exploited and used. A table is presented showing current uses of over 60 species. The primary forests are rich in both quantity and quality of timber, but present methods of exploitation destroy their commercial and protection value. The author recommends a modified selection system as the only satisfactory method of exploiting the primary forests, and the use of improvement fellings with enrichment for the secondary forest.

2. SILVICULTURE

See also Nos. 3293, 3321, 3325–6, 3330, 3332–3, 3402, 3938.

3403. STEVEN, H. M. **Changes in silvicultural practice in Scotland, 1854–1953.** *Scot. For.* 8 (2), 1954 (48–61).

3404. LACHAUSSÉE, M. -E. L'évolution de la sylviculture des forêts feuillues dans le nord-est de la France. **[The development of silviculture in the broadleaved forests of North-East France.]** *Schweiz. Z. Forstw.* 105 (3/4), 1954 (153–65 + 3 photos). [F.g.]

An historical account.

3405. JABLÁNCZY, S. A táji erdömüveléstani kutatás alapelvei. **[The principles of silvicultural research on a regional basis.]** *Erdö* 1 (3/4), 1952 (189–96, 309, 316). [Hu.russ.f.]

In 1952 the Chair of Silvicultural Studies in the Faculty of Forest Engineering at the University of Agricultural Science received approval from the Academy of Sciences for a project of research into the whole problem of regionalizing silvicultural studies in Hungary. The writer deals in a general way with the work that has to be done: records are lacking (war damage) or inadequate; past methods were too rigidly statistical; data are not available even for a proper regional classification of soils, and so on. To make good these deficiencies, information must be gathered from all possible sources, including the personal memories of old foresters who may have worked for 50 years on the same estate. Carefully used, their recollections can prove of great help, e.g. in furnishing a background for old statistical records. In order to create some sort of framework for the picture of historical development it is proposed to divide it into 3 periods: up to 1875; 1875–1950; and 1950 onwards.

3406. FOURCHY, P. **Some aspects of present-day silviculture in Switzerland.** *Quart. J. For.* 48 (2), 1954 (85–104 + 3 photos). 20 refs.

Translation of an article originally written for the *Revue Forestière Française*, and comparing French and Swiss silvicultural systems.

3407. OFFNER, H. Stirbt die Weisstanne aus? **[Is Silver Fir dying out?]** *Allg. Forst- u. Jagdztg.* 124 (2), 1952 (39–51). [G.]

Gives a brief description of natural conditions in the Pforzheim forest district, N. Baden, followed by an account of its history with special reference to the constant decline in the area under Fir from 67% of the total forest area in 1833 to 50% by 1880 and 17% in 1950, with corresponding gains on the part of Spruce. Concludes that the reason is to be found in mismanagement due to misunderstanding and neglect of the biological requirements and economic importance of Fir, and suggests a programme of counter-measures in management, silviculture and protection, with detailed discussion of each point in relation to present stand types and those seen as desirable for the future.

3408. ANTOINE, V. Traitement et régénération des peuplements d'épicéa de l'Ardenne. **[Management and regeneration of the Spruce stands of the Ardennes.]** *Bull. Soc. for. Belg.* 61 (2; 3; 4), 1954 (73–91; 113–47; 161–88 + 14 photos). 73 refs. [F.]

A comprehensive study, laying stress on the polymorphism of the species and the necessity of encouraging suitable strains. Natural regeneration ought to be obtainable in the Ardennes, but research is necessary in the management of young reproduction.

3409. ARNSWALDT, H. J. VON. Dänische Buchenwirtschaft: Eindrücke einer Studienreise. **[The management of Beech in Denmark: impressions from a tour of study.]** *Forstarchiv* 23 (11/12), 1952 (229–33). 7 refs. [G.]

Notes on the tending of young growth, the effects of Danish heavy thinning practice, and natural regeneration.

3410. ŠPANOVIĆ, T. Crni orah—*Juglans nigra* L. **[*J. nigra*.]** *Šumarstvo* 7 (1), 1954 (37–46). 1 ref. [Serb.e.g.]

Describes and lists the chief stands of *J. nigra* in Jugoslavia, with some data on propagation, and growth, and advocates detailed studies on this valuable species.

3411. DUFOREST, J. Conservons le micocoulier. **[Let us preserve the Nettle Tree [*Celtis australis*].]** *Chêne-Liège* 60 (1487), 1954 (15–6). [F.]

Notes on the silviculture of this species, formerly much grown in the south of France for the manufacture of whip handles.

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

221. *High Forest Systems*

See also Nos. 3218–21, 3416, 3425, 3927–8, 3939, 3955, 4423.

3412. JAMES, L. M. **Forest cutting practices in Michigan.** *Tech. Bull. Mich. agric. Exp. Sta.* No. 238, 1953. pp. 32. 6 refs.

Summarizes the kind of stands selected for logging, the kind of trees and class of product (sawtimber, pulpwood etc.) cut and the effect of cutting on the character of the forest.

3413. TAYLOR, C. J. **Research methods and records connected with the tropical shelterwood system in the Gold Coast.** *Emp. For. Rev.* 33 (2), 1954 (150–7 + 6 photos).

Research into the application of the Tropical Shelterwood System (T.S.S.) is described and examples are given of the research records kept. The history of the first 7 years of a coupe in the Bobiri Forest Reserve is given and from this and other experience in the Gold Coast it is concluded that the T.S.S. may be applied with good results, provided that the structure of the forest is more or less normal and that there is a reasonable number of mother trees of the desirable species in the crop.

222. *Coppice, Pollarding and Lopping Systems*

See also Nos. 3568, 3618, 3901, 3908.

3414. LASSEN, J. N. To Kroner for een? Betragtninger over Topstævningens Indflytelse paa nogle Træers Vækst. **[Two crowns instead of one? Reflections on the influence of topping on the growth of some trees.]** *Dansk Skovforen. Tidsskr.* 37 (11), 1952 (519–28) [Dan.]

Suggests, on the basis of the known tendency of topped trees to form a thicker and more cylindrical bole than trees with an undamaged axis, that deliberate topping is worth investigation as a possible means of increasing timber yield and quality.

226. *Changes of Silvicultural System. Conversion (by System or Species)*

See Nos. 3548, 3551, 3901.

228. *Constitution and Composition of Stands; Tree Classes; Forms of Stand*

See also Nos. 3178, 3343, 3369, 3417, 3878.

3415. KUOCH, R. Bergwälder und Baumartenwahl. **[Mountain forests and the choice of species.]** *Schweiz. Z. Forstw.* 105 (5/6), 1954 (249–66 + 8 photos). 7 refs. [G.f.]

The distribution of the principal Swiss mountain forest types and their structure are briefly described, and the choice of species is indicated for each type. A clear distinction is made between the durable, climax associations and the pioneer and seral associations.

23. REGENERATION AND FORMATION OF STANDS

See also No. 4394.

3416. HOLMGREN, A. Trakthuggning och föryngring i norrlandsskogarna. **[Clear felling and regeneration in the forests of N. Sweden.]** *Norrlands SkogsvFörb. Tidskr.* 1954 (1), (3–191). 58 refs. [Sw.sw.g.]

Gives data, obtained in 1952–53, on number of trees, species, dimensions and increment for areas in N. Sweden clear felled during the first 20 years of the century, and discusses the results obtained. Conclusions include the following: (1) The area clear felled should not exceed 10–15 ha. (2) Some sort of soil cultivation is necessary if natural regeneration is to succeed. (3) Burning is desirable only on hills, plateaux and nothern aspects. Light burning can often improve regeneration without doing much damage, but will rarely be sufficient for satisfactory regeneration in a short period without further measures. (4) Notch planting is particularly suitable in N. and central Norrland, where sowing is less successful. (5) Cleaning at 12 to 15 years is necessary in areas naturally regenerated or sown. (6) Timber production at about 40 years appeared to be better in sown, cleaned stands than in notch-planted stands. (7) Timber quality is similar for planted and sown, cleaned stands. (8) An original plant spacing of 1·5–2 m. is recommended. (9) *Pinus cembra*, *Abies* *sibirica*, and *Larix sibirica* have proved to be hardy and to give good timber yields, but *P. cembra* is subject to elk browsing.

231. *Natural Regeneration*

See also Nos. 3352–60, 3385–6.

3417. Mitscherlich, G., and Weihe, J. Untersuchungen an Tannenjungwüchsen. [**Studies on young growth of Silver Fir.**] *Allg. Forst- u. Jagdztg.* 124 (2), 1952 (33–9.) [G.] [Badische Forstliche Versuchsanstalt].

In autumn 1951, after a long rainy period, 70 young Fir trees (2–4 m. high) in the municipal forest of Freiburg i. Br. were pulled up obliquely by a tractor winch, digging having proved too laborious. Of these, (*a*) 37 had grown with heavy overhead shade and were markedly suppressed, and (*b*) 33 were from a clear-felled area. The roots came away fairly well from the loose, rain-softened soil, and there was no reason to suppose that the proportions lost in the two groups differed sufficiently to invalidate a cautious comparison, for which purpose measurements were made of: length of tap and lateral roots; weight of tap, lateral, and fibrous roots; stem diameter at ground level and at 0·1, 0·3, 0·5, 0·7 and 0·9 of total stem length; crown breadth, length of branches and of annual height growth, and angle of branching. In addition, needle weights were determined for the upper and lower crown portions of some typical representatives of each group, and the weight of needle-bearing twigs was found for each tree. Results are discussed and illustrated with photos and graphs. Comparing trees of equal height, (*a*) had at least as much assimilating foliage, by weight, as (*b*). Owing to the necessity of supporting much wider crowns, the stems of (*a*), though having more rapid taper, were thicker at the base and had a higher form factor, and the taproot was much more strongly developed. No difference, however, could be found between the two groups as regards weight of lateral and fibrous roots. It is concluded in general that (*a*) are not inferior in crown or root development, and that with cautious opening of the canopy their prospects of thrifty growth are as good as those of (*b*). [Cf. *For. Abstr.* 15 (No. 3337).]

3418. Roy, D. F. **Douglas Fir regeneration—a selected and annotated bibliography for use in California.** *Tech. Pap. Calif. For. Range Exp.Sta.* No. 1, 1953. pp. 27.

The 84 brief abstracts are arranged alphabetically by author, with an index to subjects.

3419. Tackle, D., and Roy, D. F. **Site preparation as related to ground cover density in natural regeneration of Ponderosa Pine.** *Tech. Pap. Calif. For. Range Exp. Sta.* No. 4, 1953. pp. 13. 2 refs.

Germination, survival, and height growth of seedlings on scarified soil and soil with duff, slash or ground cover were studied. The number of seedlings/quadrat and their height growth were significantly better on scarified sites during the 4 years of the experiment. The detrimental effect of ground cover increased with time during the experiment.

3420. Little, S., and Moore, E. B. **Severe burning treatment tested on lowland Pine sites.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 64, 1953. pp. 11. 2 refs.

Controlled burning on medium and wet sites on Pine lowlands in S. New Jersey gave a good seedbed and reduced competition from hardwoods and shrubs; stocking by Pine seedlings was good. On the wettest sites burning was uneven and on dry and upland sites hardwoods and shrubs sprouted, and further hardwood control was needed.

3421. Kaushik, R. C. **Management of Spruce (*Picea morinda*) and Fir (*Abies pindrow* and *A. webbiana*) forests.** *Indian For.* 80 (2), 1954 (78–89). 7 refs.

Discusses in detail the different ecological characters and requirements of Spruce and Fir, and suggests methods of management to secure adequate regeneration in (1) Fir forests (pure or more than 50% Fir in mixture), and (2) Spruce forests (pure Spruce or less than 50% Fir in mixture).

3422. Chitwadgi, S. S. **Artificial regeneration with selection methods of working "compensatory diffuse plantations".** *Indian For.* 80 (3), 1954 (160–4). 2 refs.

Discusses, with special reference to the Teak forests of N. Kanara, Bombay State, the advantages of supplementing advance growth by patch planting in gaps instead of clear felling and planting, and the resultant problems of management.

3423. Maudoux, E. La régénération naturelle dans les forêts remaniées du Mayumbe. [**Natural regeneration in treated forest at Mayumbe.**] *Bull. agric. Congo belge* 45 (2), 1954 (403–21). 3 refs. [F. flem.]

At Mayumbe, in dense mature forest (150–200 species/ha.) 3 annual blocks of ca. 200 ha. each have been treated under Donis' "méthode d' uniformisation par le haut" (improvement fellings involving the cutting out of climbers, old valueless stems and wolves in the upper canopy, and poorly shaped or heavy-crowned trees in the lower storeys [see *For. Abstr.* 13 (No. 2002).] The chief object is the release of poles and young trees already established, but before treatment a 1% regeneration count (one-acre plots on a 100-m. grid) was made. The data are tabulated in metre height classes up to 4 m. and above that to 20 cm. diam., separately for (*a*) dominants and co-dominants and (*b*) dominated and shrubs. Initial regeneration of (*a*) is adequate but only 1 in 14 survives to pass out of the 0–1 m. class, and these are halved at the 2-m. and again at the 3-m. entry points. The differing amounts of regeneration in the 3 blocks showed that higher successional status carries lower regeneration numbers, particularly in light-demanders. About ½ the tree regeneration belongs to (*a*) which contribute ca. ½ of the 0–1 m. and ca. ⅓ of each of the higher classes. Survival is shown in graphs separately for (*a*) and (*b*) and for the 3 blocks.

Of the 77 species of (*a*), 15 regenerate in numbers above the species mean and make up 85·7% of the total regeneration of (*a*). Of this, 55·7% is found by 6 species, the subsequent poor survival of which indicates a demand for more light than naturally prevails (*Oxystigma*, *Deinbollia*, *Guarea*, *Newtonia glandulifera*, *Gossweilodendron*, and *Lovoa trichilioides*). The other 30% is supplied by 9 species in better balance with natural conditions (*Cistanthera*, *Chrysophyllum*, *Polyalthia*, *Pentaclethra*, *Newtonia leucocarpa*, *Hylodendron*, *Dialium*, *Corynanthe*, *Gilletiodendron*). A third group of 7 species, well adapted but poorly distributed, raises the regeneration provided by these 22 species to 89·2% of the total for (*a*). These species supply 8 to 9 tenths of the regeneration in *each* height class. The data for each of the 3 species groups are separately graphed. All 22 species either are under or have been under utilization test. All could be used in certain applications and 8 are already in the trade. A table shows plot frequency % for 16 species rating higher than 20%. Contrasted with the numbers involved in strip planting (100–200/ha., 1 to 2 m. high) are the 1046 plants/ha. > 1 m. established on natural sites, mostly of valuable species and reinforced by a larger number of younger recruits, which are evident in the count.

3424. Arief, S. M., and Saman, S. M. Permudaan alam di Belitung. **[Natural regeneration in Billiton.]** *Rimba Indonesia* 3 (1/2), 1954 (62–8 + 4 photos). [Jav.e.]

The soil in Billiton is of two kinds—a yellow reddish soil with fair physical properties, and a white sand unsuitable for tree growth. Investigations in the Gunung Duren area showed that the commonest species are *Shorea ovalis*, *Pentace triptera*, *Hopea diversifolia*, and *Dysoxylum acutangulum*; their silvicultural characteristics and wood properties are discussed. Requirements for natural regeneration include retention of seed trees, removal of worthless species by girdling or poisoning, removal of pioneer growth, and protection against fire. *From authors' summary*.

3425. Jacobs, M. R. **Silvicultural problems in the mixed Eucalypt forests of the east coast of Australia**. *Emp. For. Rev.* 33 (1), 1954 (30–8 +8 photos).

Growth habits affecting the regeneration of Eucalypts are described. Factors discussed include leaf production, the importance of advance growth, the relative significance of light and moisture, biological phenomena in a gap in the forest, the sequence of weeds following fire, the response of different species after crown fires, and the disintegration of slash. The effect of the shortening of the trunk during growth is briefly dealt with, and suggestions are made as to the future structure and yield of forests managed under the group selection system. *Author's summary*.

3426. Daggash, M. **Comparative figures for coppice growth in the Sudan savannah [of N. Nigeria].** *Inform. Bull. For. Dep. Nigeria* No. 15, 1954. pp. 2.

Height-growth data of coppice regrowth are given from experimental plots at Dutsin Kura, to illustrate comparative rates of growth of different species under various conditions of grass burning (burning early in the dry season (1) annually, (2) biennially, (3) every 4th year, (4) burning annually late in the dry season; and (5) completely protected from fire). The data refer to the following species: *Acacia ataxacantha*, *A. macrostachya*, *A. senegal*, *A. seyal*, *Anogeissus schimperi*, *Cassia singueana*, *Combretum glutinosum*, *C. micranthum*, *Commiphora africana*, *Croton amabilis*, *Dichrostachys glomerata*, *Feretia canthioides*, *Grewia flavescens*, *G. mollis*, *Guiera senegalensis*, *Piliostigma reticulatum*, *Randia nilotica*, *Ximenia americana*, *Zizyphus mauritiana* and *Z. mucronata*.

3427. Hyodo, M. **[Characteristics of coppice shoots of *Edgeworthia papyrifera* (Kochi-race).]** *J. Jap. For. Soc.* 35 (6), 1953 (189–91). [Jap.e.]

A positive close correlation was found between stem height and diameter, and between stem height and fresh weight, in 2– to 3-year-old coppice but none between stem height and root length. Mean values for coppice shoots selected at random were: height 47·7 ± 0·6 cm., diam. 5·3 ± 0·1 mm., and weight 5·7 ± 0·29 g. *From author's summary*.

232. *Artificial Regeneration*

232.1. Choice and Trial of Species, Races etc.

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 3300, 3308, 3326, 3329, 3416, 3583.

3428. Köhler, A. Der Kulturerfolg des Nadelholzanbaus in einem nordhessischen Revier. **[The comparative success of conifer plantations in a forest range in N. Hesse.]** *Allg. Forst- u. Jagdztg.* 124 (7), 1953 (215–8). 11 refs. [G.g.e.]

Conifer plantations, insignificant in scale in 1820, now occupy 69% of the area of the Hersfeld-West forest district, which originally carried deciduous forest with Oak, Beech, Birch and Aspen as the chief species. The author reviews the history of these plantations, formed by planting or direct sowing, and compares the present areas of the stands with those at the time of formation, separately for German and exotic conifers. Area losses for Scots Pine have been less than for Norway Spruce, so that the former is now better represented than the latter. Larch, often sown in mixture with Pine or Spruce, has suffered much higher losses; these are attributed largely to failure of the Larch to maintain its lead in height growth over the main species and to a consequent higher liability to canker. If Larch is to be maintained, it must be confined to suitable sites and favoured by careful tending; mixture with Spruce, in particular, is clearly inadvisable. Of the exotics mentioned—*Pinus nigra*, *P. strobus* and "green" Douglas Fir—the last has given excellent results and should be encouraged. As it suppresses the other species, however, it should be mixed in groups rather than tree-by-tree. Pruning is essential on account of its tendency to form an excessively large crown.

3429. Macdonald, J., Fourt, D. F., and Christie, J. M. N. ***Cupressus macrocarpa* plantation near Seaford, Sussex.** *Quart. J. For.* 48 (2), 1954 (128–31).

A plantation of *Cupressus macrocarpa*, planted in 1912 on very infertile chalk downland, is described. At 35 years old, mean height was 53 ft., mean quarter girth 7·25 in., and total standing volume 3750 Hoppus ft./acre.

3430. Pavari, A. L'expérimentation de *Castanea mollissima* en Italie. **[Trials of *C. mollissima* in Italy.]** [*Pap.*] *2*^{e} *Sess. Comm. int. Chât.* No. *FAO/CH/*10, 1953. pp. 9. [F.]

A progress report on trials begun in 1950, with material from the U.S.A. with the purpose of breeding *Endothia*-resistant trees.

3431. Ciumac, G., and Vlase, I. Contribuţii la răspândirea şi desvoltarea speciei *Pinus ponderosa* Dougl. la noi in ţară. **[The propagation and growth of *P. ponderosa* in Rumania.]** *Rev. Pădurilor* 68 (3), 1953 (15–8). 2 refs. [Rum.rum.russ.]

Describes some examples of *P. ponderosa* in Rumania, discusses its climatic requirements, and concludes that it is worth trying in mountainous regions in the north of Rumania.

3432. Haralamb, A. Aspecte din cultura exoticelor in regiunea Galaţi. **[Growing exotic species in the region of Galati.]** *Rev. Pădurilor* 69 (2), 1954 (13–5). [Rum.rum.russ.]

Notes on the performance of *Juglans nigra, Gymnocladus dioica, Koelreuteria paniculata, Acer saccharinum, Paulownia tomentosa, Broussonetia papyrifera* and *Xanthoceras sorbifolia*.

3433. Purcelean, S. Despre comportarea stejarului de plută (*Quercus suber* L.) in plantaţiile experimentale din ani 1951–1952. **[The performance of experimental plantations of *Q. suber* [in Rumania] in 1951–52.]** *Rev. Pădurilor* 68 (8), 1953 (39–40). 7 refs. [Rum.]

3434. Purcelean, S. O specie exotică producătoare de gutapercă cultivabilă in ţara noastră: *Eucomia ulmoides* Oliv. **[*Eucommia ulmoides:* a gutta-percha-producing species that can be grown in Rumania.]** *Rev. Pădurilor* 68 (11), 1953 (29–33). 9 refs. [Rum.rum.russ.]

Gives some results of experiments in growing this species in Russia and in arboreta in Rumania, and discusses its climatic requirements at some length, giving meteorological data from a number of stations in China.

3435. Irmak, A., and Saatçioğlu, F. Trakya ve Kocaelinde Kavak yetiştirilmesi imkânları üzerine araştırmaları. **[Investigation of the possibilities of Poplar cultivation in Trakya and Kocaeli [Turkey].]** *Istanbul Üniv. Orm. Fak. Derg.* 3*B* (1/2), 1953 (65–80). [Turk.]

Chief reliance should be placed on American species successful in Italy and also *Populus nigra* var. *italica*. Two places, one in the valley of the Meric (e.g. Kurtbucağı forest) and the other near Adrianople are recommended, but would need water in summer. No other places appear suitable.

3436. Matsui, Z., and Shinohara, H. **[The growth of Pine plantations near Otaru.]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952,* 1953 (146–54). [Jap.e.]

Details of growth for *P. nigra, P. koraiensis* (both 48 years old) and *P. sylvestris* (37 years) are given in tables with English legends. *P. sylvestris* at 35 years showed 995 trees and 263 cu.m./ha.

3437. Coutan, Dauplé, and Novel. Le Sesbania —son utilisation au Maroc. **[The use of *Sesbania* in Morocco.]** *Terre maroc.* 28 (290), 1954 (16–7). [F.] E.M.B.

In sowing trials carried out by the Horticultural Service from 1950 to 1952, *S. aegyptiaca* made rapid growth, reaching heights of 2–2·5 m. within a few months. Since 1952, seeds have been widely distributed and have given good results in different parts of the country. *S. aegyptiaca* is being used in market gardens and young orchards as a temporary windbreak for crops. Recommendations on its cultivation are made.

3438. Parry, M. S. **Tree-planting in Tanganyika. III. Species for dry areas.** *E. Afr. agric. J.* 19 (3), 1954 (154–60).

Some 46 species are given with notes on their cultivation. [Cf. *For. Abstr.* 14 (No. 3251); 15 (No. 2406).]

3439. Carrasco M., M. Primeros resultados de reforestación con coníferas exóticas en las Zonas Pre-Cordilleranas de la Provincia de Valdivia. **[Preliminary results of afforestation with exotic conifers in the Andean foothills of Valdivia province.]** In *Bosques y Maderas* [special issue of *Chile maderero*] 1954 (11–4). [Span.]

A report on raising and planting *Pseudotsuga taxifolia, Picea sitchensis, Chamaecyparis lawsoniana* and *Pinus taeda*. Work has been proceeding for 8 years. So far only *P. sitchensis* has proved disappointing.

232.12. *Races and Provenance Trials*

See also Nos. 3326, 3763–4.

3440. Fischer, F. Einige Ergebnisse aus dem internationalen Lärchenversuch 1944. **[Results from the 1944 international Larch trial.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 28, 1952 (355–407). 18 refs. [G.g.f.]

At Hönggerberg near Zürich (535 m.) the best results for height growth, uniformity, form, and freedom from disease up to 8 years were with the Austrian lowland, the Slovakian Tatra and the Sudeten types. Planting distances, even for rapid growing forms, should not exceed 1·5–2 m., the slower local forms requiring 1·25 m. Weedings should be made in the first and if possible the second years. The rapid growth of the chance hybrid (Scots and Japanese) from Denmark indicates a further line of choice though local specimens incline to broad crowns and coarse branching. Two each of the Austrian and Swiss highland forms showed no incidence of *Dasyscypha willkommii*. All Alpine and Polish forms suffered from annual attacks (and thereby loss of increment) from *Meria laricis*, the Austrian lowland, the Japanese and the Tatra forms being free. *From author's summary.*

3441. Enescu, V. Contribuţii la selecţia formelor de molid *chlorocarpa* Purk. şi *erythrocarpa*

Purk. **[Choice of the *chlorocarpa* and *erythrocarpa* forms of *Picea abies*.]** *Rev. Pădurilor* 69 (1), 1954 (21–5). 3 refs. [Rum.rum.]

Germination tests with seed from the two forms indicated that f. *erythrocarpa* is the more suitable for use on sites above 950 m. altitude and for the more northerly parts of Rumania.

3442. LØFTING, E. C. L. *Pinus contorta* i Danmark. **[*P. contorta* in Denmark.]** *Dansk Skovforen. Tidsskr.* 37 (2), 1952 (45–61). [Dan.] [Statens forstlige Forsøgsvæsens afdeling for hede- og klitskove.]

A discussion in general terms [without growth data], emphasizing the importance of provenance and of further provenance trials. Some of the older stands on poor, difficult sites on the Danish dunes and heaths have shown surprising growth for such conditions and are derived from seed of the coastal *P. contorta*. This type, as seen by the author in Oregon, formed isolated groups on dunes and other poor sites—sometimes boggy and with hardpan. The trees resembled those raised in Denmark from imported seed, much of which is known to have come from this region. A better match for the cooler and drier climate of Denmark might well be found farther north. The form of branching even in the best Danish stands of *P. contorta* is very variable, including both coarse- and relatively fine-branched trees. Some plantations show very poor crown form, due in some cases to attack by *Rhyacionia buoliana* and in others perhaps to unsuitable provenance. Growth culminates early, but between 30 and 40 years the plantations reach volumes excelling anything attainable by other species on such poor sites. There is every reason to collect seed from the best Danish stands, to start breeding work with the best trees and to try further provenances, e.g. from Washington and British Columbia. In addition to its tolerance of both ill-drained compact and clayey soils and dry sands and gravels, *P. contorta* has a high wind and salt-spray resistance and regenerates naturally in Denmark. In closed stands practically all ground vegetation is stifled out and the considerable needle litter decomposes very slowly. Its success on poor sites is probably due to efficient exploitation of the soil by its roots, and hence it is suggested that wide spacing or early and frequent thinning should be advantageous. Apart from the occasional malformation caused by *R. buoliana*, there have been cases of failure of whole plantations in youth and, more often, of sudden death of individual trees in older plantations. Some of these failures have been caused by *Dasyscypha calyciformis*, in others *Fomes annosus*, perhaps in combination with *Myelophilus piniperda*, has been to blame. There have lately also been occasional attacks by *Dendroctonus micans*. As, therefore, diseases and pests may possibly prove troublesome, it would be wise not to count on any but short rotations.

Results with the inland forms first imported as "*P. murrayana*" have mostly been disappointing. There are a few excellent old stands, e.g. at Skærbæk (provenance unknown) and Middelfart (known to be derived from Montana seed, but exact source unknown). Some young plantations also look promising but, in the past, early promise has not always been fulfilled. The difficulty with the inland form may be that many of the native localities in America have a markedly continental climate with hot dry summers, and it is noted that the two old Danish stands mentioned above are in warm sites. More suitable provenances might perhaps be found in the lower Fraser River valley, Washington, and British Columbia. In general, the inland forms can at present only represent material for experiment in Denmark, whereas—despite the need for further research—the supply of suitable coastal *P. contorta* seed is assured and the value of this form as a pioneer species is well recognized.

3443. FIELDING, J. M. **Variations in Monterey Pine.** *Bull. For. Timb. Bur. Aust.* No. 31, 1953. pp. 43. 41 refs.

Discusses: (*a*) the variation between the 4 known natural stands of *Pinus radiata* (3 on the mainland of California and one on the island of Guadalupe), and recommends the use of the Guadalupe strain in breeding programmes, in which it has not yet been employed; (*b*) variations in clones from different provenances in Australia as revealed in clonal trials. Variations occur in rate of growth, immunity to disease and insect attack, wood properties, form of stem, crown characteristics, and flowering.

3444. ROHMEDER, E. 23jährige bayrische Anbauversuche mit grüner Douglasie verschiedener Herkunft. **[23-year-old trials in growing Douglas Fir [var. *viridis*] of varying provenance in Bavaria.]** *Forst- u. Holzw.* 9*A* (9), 1954 (179–80). [G.]

Experiments in the establishment of Douglas Fir of different provenances were begun in 1932–34 by the Waldbau-Institut of the Forstliche Forschungsanstalt, Munich, and the trial plots later came under the authority of the Institut für Forstsamenkunde und Pflanzenzüchtung in Munich. Measurements and observations were made in the plots in 1951, and results are presented. For middle altitudes in Bavaria, seed from the western slopes of the Cascade Mountains (altitudes 100–300 m.) proved most suitable both for growth and yield and for resistance to attack by *Phaeocryptopus gäumannii*.

232.13. *Trials of Hybrids and Other Products of Tree Breeding*

3445. **Directions for the survey of Poplar areal plots by the National Poplar Commission of the Netherlands.** [*Pap.*] *7th Sess. int. Poplar Comm.* No. *FAO*/53/8/6312, 1953. pp. 10.

Directions for (1) methods of measurement, (2) design of experimental plots, in research on Poplar clones.

3446. ARENTSENS, S. Ocho años de observaciones en álamos. **[Eight years of observations on Poplars.]** In *Bosques y Maderas* [special issue of *Chile maderero*]. 1954 (15). [Span.]

About 6000 ha. of land in Chile is now under Poplar. The Departamento de Sanidad Vegetal has been working for 8 years in the "Miraflores" experimental area at Rengo to find rust-resistant species and hybrids. Of the trees imported and tried out, the hybrid "*Populus A.M.*" has proved highly resistant and is recommended for extending plantations in Chile.

3447. **Hybrid Willow cuttings in the Delta and South Arkansas**. *Rep. Sth. For. Exp. Sta. 1953*, 1954 (12–3).

In Mississippi only 6 of 112 Danish hybrid Willow cuttings survived and reached a height of 6 in. in the first growing season, while all 14 native *Salix nigra* planted lived and grew to about 3 ft. Hybrid cuttings planted at Crossett in March had all survived at the end of May but 30% were dead by early autumn. Native *S. nigra* was much taller by the end of the season.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 3602, 3605.

3448. Roy, D. F. **Effects of ground cover and class of planting stock on survival of transplants in the eastside Pine type of California**. *For. Res. Note Calif. For. Range Exp. Sta.* No. 87, 1953. pp. 6.

Trials with *Pinus ponderosa* and *P. jeffreyi* showed that survival after 2 years was better from 1 + 1 than from 1 + 0 planting stock and that survival decreased with increasing amounts of ground cover on the site. Survival was best on bare sites with no stones, decreasing in order through sites with slash, open stony ground, in shrub cover, in grass and sedge, and in *Ceanothus prostratus*. Results are statistically analysed and tabulated.

3449. Samset, I. Markberedning med maskiner og håndkraft. **[Mechanical and manual screefing.]** *Medd. norske Skogforsøksv.* 11 (2) (No. 39), 1952 (182–307). 7 refs. [Nor.e.]

A study was made in 1949–50 on screefing by hand, and using different horse- and tractor-drawn harrows with different tractors. Detailed studies were made of time at the working place and formulae are given for calculating time spent on the different operations for different lengths of the regeneration area, different distances between plots or rows and different thicknesses of the humus layer. In the manual work, performance varied with depth of humus layer and of slash. For 100–m.–long plots with humus varying from 2 to 10 cm. in depth, hoeing represented 83–92% of the total productive time, walking between patches 11–5% and walking to a new row 6–3%. Piece-work rates should be adjusted to allow for differences in humus depth. The horse-drawn harrows were not too heavy, but the use of experienced and docile horses is desirable and horses should only be used for work over short periods; a crew of 2 men is desirable, as regards both quality and speed of work. There was little difference in total performance between the two horse-drawn harrows tested. The cost per 0·1 ha. was Kr. 4·58–5·09 for the Imset and Kr. 4·70–5·40 for the Hope horse-drawn harrows. When tractor-drawn harrows were used, depth of humus and slash had no effect on performance but this was strongly influenced by the roughness of the ground. The Fordson Major half-tracked tractor was unsuitable on rough ground, and the Bristol-20 tractor was generally unsuitable, but both the M.A.N. tractor with 4-wheel drive and the crawler tractor Oliver Cletrac HG–42 proved very suitable. Details are given of performance using 4 tractor-drawn harrows. Generally costs were less and performance higher with a disk-harrow. Horse-drawn harrows are suitable for humus depths not exceeding 5 cm., the tractor-drawn disk harrow for those not exceeding 7 cm., and the tractor-drawn Imset harrow I could be used for depths to 10 cm. There is a full English summary and English legends to tables and figures, and the different types of harrow and tractor are illustrated.

3450. Devred, R., and Père, J. Le traitement des sols schisto-calcaires du Bas-Congo par les explosifs agricoles. **[Treatment of calcareous schist soils with explosives in the lower Congo.]** *Bull. agric. Congo belge* 45 (2), 1954 (282–352). 7 refs. [F.flem.]

Describes the site factors in the 30,000-ha. land-use experiment area at Mvuazi, 75% of which has extremely intractable, heavy compact soils, the reconstitution of which has a wide application in the lower Congo. The first aim is to stimulate recolonization by natural and planted vegetation by loosening the soil and subsoil to assist water absorption and retention, root penetration, aeration and the destruction of compact and gravelly pans. The kinds, methods and precautions required in the field use of explosives are detailed and the preliminary results of studies in (*a*) "microfissuration", (*b*) craters and regeneration, (*c*) discontinuous contour ditches, are given, with comparison of first costs with that of hand labour. For (*a*) the charge, depth, spacing and type of explosive were varied with the object of producing the most extensive network of fine fissures without dislocating the profile. Charges of 100 g. of dynamite or 300 g. of barutite at 0·8 and 1·2 m. deep respectively have been selected for further trial. Profile examinations of the results are made and hydrological studies will continue over a year. The area will be planted to *Eucalyptus grandis*. In (*b*) the craters are arranged in quincunx, 3 × 2 m., on the slope, 4 soil types and the inclination of the drill hole being further variations. The results are illustrated in 18 vertical sections down the slope, criteria of success being depth of working, dimensions of the explosive chamber, depth of cut, presence of fill, length and breadth of terrace, and size of fissures. These craters prepare the ground for trials in afforestation. The hold-up of moving soil and the formation of tilth are further aspects under study. Similar studies are being made with (*c*), the object of which is to speed up the establishment of anti-erosion vegetation. First costs with explosives are exorbitant but total costs to the closing of the crop may be less than that for hand labour, which is anyhow insufficient and rising in cost.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. *Seed*

3451. Baldwin, H. I. **Handling tree seeds.** *Unasylva* 8 (2), 1954 (66–70).

An excerpt from a technical study, to be published later, on collecting, extracting, cleaning, testing, storing and transporting tree seeds.

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also Nos. 3354, 3476–7.

3452. GALOUX, A., and REGINSTER, P. L' inventaire des peuplements à graines de Belgique. **[The inventory of élite stands for seed production in Belgium.]** *Trav. Sta. Rech. Groenendaal* (*Sér. B*) No. 15, 1953. pp. 32 + 11 plates. 9 refs. [F.]

An account of the proposed inventory and the general criteria of age, altitude, area, location, and treatment of stands, with more detailed genetic criteria for *Quercus robur* and *Q. sessiliflora*, *Pinus sylvestris*, *Picea abies*, *Pseudotsuga taxifolia*, *Larix leptolepis*, *L. decidua*, and the several varieties of *Pinus nigra*.

3453. REGINSTER, P. Méthode d'appréciation des peuplements à graines. **[Methods of appraising élite stands for seed production.]** *Bull. Soc. for. Belg.* 61 (5), 1954 (217–244 + 3 plates). [F.]

Describes the criteria applied by the Research Station at Groenendaal to Oaks, Beech, Spruce, Scots Pine, Corsican and Austrian Pine, Douglas Fir, and European and Japanese Larch.

3454. DELLINGSHAUSEN, M. VON. Der Anteil fremden Pollens bei der Befruchtung in einer Birkensamenplantage. **[The proportion of foreign pollen fertilizing a Birch seed orchard.]** *Z. Forstgenet.* 3 (3), 1954 (52–3). 4 refs. [G.e.]

Preliminary trials in attempting to measure by the use of pollen traps, the drift of pollen from a group of Birches into a seed orchard situated about 300 m. away. The first year's results indicate that the seed will be very little affected by foreign pollen from this particular source.

3455. PERSSON, A. Plantagefrö av masurbjörk. **[Seed orchard production of figured-Birch seed.]** *Skogen* 41 (9), 1954 (160–1, 163). [Sw.]

Gives particulars of seed production from a number of graft trees of figured Birch in a seed orchard at Ekebo.

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also Nos. 3479–80, 3641.

3456. SCHOENIKE, F. E., and HANSEN, H. L. **Viability of Black Spruce seed in four-year-old logging slash.** *Minn. For. Note* No. 29, 1954. pp. 2. 3 refs.

Collections were made from cones: (1) > 2 ft. above ground, (2) 6–12 in. above ground, (3) on ground surface, and (4) buried in moss. Germination % for the different lots was (1) 3, (2) 12, (3) 8, and (4) 1. Germination generally was too low to make collection from old slash advisable.

232.315. Seed Storage and Treatment

3457. HARADA, Y., and YANAGISAWA, T. **[Results of seed-storage experiments for some trees.]** *Rep. Sapporo Br. For. Exp. Sta., Hokkaido* No. 71, 1952 (26–46). 5 refs. [Jap.e.]

The following results were obtained from storage experiments over 2–3 years: (1) storage at 3% and at 80% moisture content both gave unsatisfactory results. For *Abies sachalinensis* var. *mayriana*, *Picea jezoensis*, *P. glehnii*, *P. abies* and *Pinus densiflora* best results were obtained from storage at 20–40% m.c. Pine seeds were relatively little affected by moisture. (2) Atmospheric pressures of 300–400 mm. gave the best results. (3) Exposure to ultra-short waves (wave-length 6 m.) for 10–120 sec. improved germination of *A. sachalinensis* var. *mayriana* but not of Larch. (4) Germination of *A. sachalinensis* var. *mayriana* was increased by storage with different chemicals, but that of *P. densiflora* and *P. thunbergii* was not much affected. $MgCl_2$ and Uspulun were excellent disinfectants. Seeds soaked in tannin and β-indolyl-acetic-acid solutions germinated better than controls. Wood ash and Adsol were excellent desiccants but seed stored with limestone or $CaCl_2$ was too dry. *From authors' summary.*

3458. LAMPRECHT, H. Resultados preliminares de unos estudios sobre tratamientos y conservación de semillas forestales. **[Preliminary results of studies in treatment and preservation of forest seed.]** *Bol. Ingen. for. Univ. Los Andes* 1 (1), 1954 (5–12). 5 refs. [Span.]

Since 1952 the Laboratorio de Selvicultura, Universidad de Los Andes, has investigated the properties of seed of 53 native and 16 exotic species. The results will be published elsewhere. Meanwhile the author presents brief data on (1) the treatment of seed with fleshy fruit, (2) treatment of seed with a hard endocarp, and (3) methods of preserving the germinative capacity of seed.

3459. RUDOLF, P. O. **Low temperature seed storage for Western conifers.** *Misc. Rep. Lake St. For. Exp. Sta.* No. 20, 1952. pp. 8. 5 refs.

Gives data for 19 species on seed-year frequency, and cold-storage results from several published sources for *Pseudotsuga taxifolia*, *Abies grandis*, *A. procera*, *Pinus jeffreyi*, *Pinus contorta* var. *latifolia*, *P. ponderosa*, *P. lambertiana*, *P. monticola*, *Sequoia sempervirens* and *Picea engelmannii*.

3460. TOPOR, D. Sondă pentru măsurarea temperaturii interioare şi luarea probelor de ghindă din depozitele puse la iernat. **[An instrument for measuring the temperature in, and obtaining samples of acorns from, storage trenches in winter.]** *Rev. Pădurilor* 69 (3), 1954 (142–3). [Rum.]

The instrument (illustrated by a diagram) is designed on the principle of an increment borer, but also incorporates 3 thermometers.

3461. ANČÁK, J. Skúsenosti s prezimovaním žalud'a v roku 1952–53. **[Experience gained from the 1952–53 winter storage of acorns [in Slovakia].]** *Pol'ana* 9 (11), 1953 (250–5). [Slovak.]

From a total harvest of ca. 2600 tons, over 1000 tons of acorns were stored, using 39 different methods, results for which are tabulated. The following proved best: (1) layered with snow; (2) spread 5–10 cm. thick on the forest soil and covered with 10–20 cm. of litter; (3) immersion in running water; (4) in a roofed pit 120–150 cm. deep, mixed and topped with sand; (5) in ventilated outbuildings, on soil mixed with sand, and (6) as (5), in ventilated house rooms. Poorest results were obtained with acorns stored in an attic at a low air humidity and somewhat elevated temperatures.

3462. Popescu, I. N. Păstrarea ghindei in timpul iernei. **[Winter storage of acorns.]** *Rev. Pădurilor* 69 (1), 1954 (33–7). 3 refs. [Rum.rum.]

Experiments were made on 3 methods of storing acorns: (1) spread on a platform in the forest and covered with litter, (2) in a trench of 1 × 1 m. section and layered with sand, and (3) in a trench of 40 × 50 cm. section and layered with sand. Best results were obtained with (3).

3463. Stanescu, C. Consideraţii asupra semănării ghindei in pepiniere. **[On sowing acorns in nurseries.]** *Rev. Pădurilor* 68 (11), 1953 (19–21). [Rum.rum.russ.]

Notes on methods used at Ploeşti, including stratification, warm-water soaking, root pruning, and treatment with formalin to prevent damping off. It was found that treatment in a 1·2% formalin solution for 5 min. when radicles were 3–5 cm. long, gave excellent results.

3464. Rubţov, S., Topor, D., and Păun, V. Semănături de toamnă in pepinieră cu ghindă incolţită. **[Autumn sowing of pre-germinated acorns in nurseries.]** *Rev. Pădurilor* 69 (1), 1954 (30–2). 1 ref. [Rum.rum.russ.]

Experiments showed that autumn sowing of pre-germinated acorns gave better developed seedlings than spring sowing.

3465. Popescu, N. Contribuţii la problema obţinerii de puieţi de stejar cu inrădăcinarea fasciculată. **[How to obtain Oak seedlings with branched roots.]** *Rev. Pădurilor* 69 (2), 1954 (26–9). 3 refs. [Rum.rum.]

Acorns are layered in sand and stored until spring, when the radicles (5–6 cm. long) are pruned and the acorns sown either direct or in the nursery. The resulting seedlings have well branched roots, and a much higher % of establishment is obtained.

3466. Tyszkiewicz, S., and Dąbrowska, J. Stratyfikacja nasion drzew i krzewów leśnych. **[Stratification of the seeds of forest trees and shrubs.]** *Roczn. Nauk leśn.* 1, 1953 (155–221). 42 refs. [Pol.pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 102).

Presents results of research carried out in 1948–51 on 268 seed samples of 5 tree and 22 shrub species. Seeds were mixed with river sand, placed in boxes with stainless-steel gauze bottom and lid, and buried in sandy soil at different depths; other samples were treated in a cellar or sown in autumn without stratification. It was found that early collection of fruit favours early spring germination in *Fraxinus excelsior*, *Carpinus betulus*, *Tilia cordata*, *Sorbus aucuparia*, *Euonymus verrucosus*, *E. europaeus*, *Sambucus nigra*, *S. racemosa*, and *Prunus serotina*; late collection was found to be favourable only for *Lonicera xylosteum*. Unfavourable effects of fleshy fruit on germination were observed in *Sorbus aucuparia*, *Crataegus monogyna*, *Taxus baccata*, and *Prunus spinosa*. Drying of fruit before sowing or stratification was beneficial for *Sambucus racemosa*, *Prunus serotina*, *Rhamnus frangula*, *Ligustrum vulgare*, *Ribes alpinum* and *Prunus spinosa*, and unfavourable for *Taxus baccata*, *Crataegus monogyna*, *Sorbus aucuparia*, *Tilia cordata*, *Rosa canina*, and *Euonymus verrucosus* and *E. europaeus*. Autumn sowings gave best results for *Sambucus nigra*, *S. racemosa*, *Taxus baccata*, *Carpinus betulus*, *Fraxinus excelsior*, *Sorbus aucuparia*, *Tilia cordata*, *Euonymus verrucosus* and *E. europaeus*; unsatisfactory results were obtained with *Prunus serotina*, *Cornus sanguinea*, *Crataegus monogyna*, *Fraxinus excelsior* (ripe seed), *Juniperus communis*, *Viburnum opulus*, *Tilia platyphyllos* and *Rosa canina*. As a rule, a lower yield and lower growth rate were observed for autumn sowing compared with spring sowing following stratification, but the growth rate for autumn sowing was more uniform. The 3 depths of stratification used were favourable for different sets of species (listed); stratification in a cellar generally gave poor results.

3467. Allen, G. S., and Bientjes, W. **"Naked stratification" key to improved tree seed testing and increased nursery production.** *B.C. Lumberm.* 38 (4), 1954 (112, 114). (*Res. Note Fac. For. Univ. B.C.* No. 6).

Douglas Fir seeds germinated successfully after soaking in tap water for about 30 hr., surface drying, and storage at 0–2° C. for 6 weeks. Similar pretreatment gave good results with other species. A method of testing germination is described. Results are to be presented in more detail elsewhere.

3468. Guinaudeau, J. Germination du pin maritime: résultats des expériences réalisées par l'annexe de la Station de Recherches à Bordeaux. **[Germination of *Pinus pinaster* seed: results of experiments carried out at the Bordeaux Research Station.]** *Rev. for. franç.* 6 (5), 1954 (320–30). [F.]

Further studies on effect of depth of covering, watering, sowing season, and seed treatments on germination of *P. pinaster* seed [cf. *For. Abstr.* 13 (No. 3776).]

3469. Kantor, J. Vliv máčení semene sosny ob. (*Pinus sylvestris* L.) a smrku ob. (*Picea excelsa* L.) ve stimulátorech růstu na klíčeni a vývoj semenáčků. **[Effect of the soaking of *P. sylvestris* and *P. abies* seeds in growth regulators on the germination and development of the seedlings.]** *Acta Univ. Agric. Silv. Brno* 1952 (3/4), (291–7). 5 refs. [Cz.russ.] I.I.E.

Experiments in an experimental nursery near Brno on Pine and Spruce seeds soaked, before sowing, in 2,4,-D solutions of different concentration showed that the use of this growth regulator reduced the mortality rate and increased the growth rate. Sowing in humus gave better results than sowing in soil.

3470. Migita, K., and Kawana, A. **[Germination of Sugi (*Cryptomeria japonica*) seeds in H_2O_2 solution.]** *J. Jap. For. Soc.* 35 (12), 1953 (381–2). 9 refs. [Jap.jap.e.]

Seeds kept for ca. 10 days in distilled water, with the addition of different quantities of H_2O_2, germinated. Germination % increased with increasing strength of the solution.

3471. Harada, H. **[Distinguishing between the two seed types of *Albizzia julibrissin*, and methods of hastening germination of hard seeds.]** *J. Jap. For. Soc.* 35 (6), 1953 (186–9). 7 refs. [Jap.jap.e.]

Hard seeds can be distinguished from the others by NaCl solution, sp. gr. 1·2. Germination of the hard seeds can be hastened by scarifying the seed coat, soaking in concentrated H_2SO_4 for 60 min. or soaking in water at 50° C. for 5–30 min. The last method is recommended for use in practice. *From author's summary.*

232.318. Seed Testing. Germination Tests. Seed Quality.

See also Nos. 3355, 3467.

3472. **[Germination tests.]** *Rep. For. Dep. Trin. Tob. 1952*, 1954 (15–6).

Germination tests on 13 species were made on sterile blotting paper in Petri dishes. Teak gave poor results, but good correlation between laboratory and field %s of germination was obtained with *Pinus caribaea*, *Swietenia macrophylla*, *Cedrela mexicana*, *Cordia alliodora*, and *Simaruba amara*. Storage of *C. mexicana* seed in a glass jar with $CaCl_2$, or in a refrigerator gave good results.

3473. Hashimoto, N., Shihara, I., and Ishikawa, S. **[Effect of coloured light on the germination of forest tree seeds.]** *J. Jap. For. Soc.* 36 (3), 1954 (63–5). [Jap.e.]

Seeds on agar in Petri dishes were irradiated continuously for 2 weeks through different coloured cellophanes. With *Paulownia tomentosa*, *Alnus tinctoria* var. *glabra* and *A. firma*, optimum germination % was recorded in white, red and yellow lights, and no germination in green and blue lights and darkness. Germination of *Pinus densiflora* and *P. thunbergii* was good in white, red and yellow, and less good in green, blue and darkness. For *Chamaecyparis obtusa* and *C. pisifera* rates were fairly good for all lights but very poor in darkness. [Photographs and graphs have English legends]. *From authors' summary.*

3474. Yanagisawa, T., and Asakawa, S. **Woody plant seed viability tests with tetrazolium salts.** *J. Jap. For. Soc.* 35 (2), 1953 (40–2). 3 refs. [E.jap.]

Tests were made on 2,3,5-triphenyl-tetrazolium chloride (TTC) and K_2TeO_3. Experiments on the light sensitivity of TTC showed that indoors it was necessary only to avoid direct sunlight, though the use of brown Petri dishes proved an additional safeguard. Optimum conditions for the use of TTC were studied and it is concluded that using an 0·5 TTC solution (pH ca. 4·6) in distilled water (pH ca. 6·0) the sample should be treated for 20 hr. at 25° C., 18 hr. at 30° C. or 15 hr. at 38° C., after which dark staining of the embryo will indicate viability. TTC proved preferable to K_2TeO_3 in the concentration and length of treatment needed, but even at these lower concentrations was more expensive.

3475. Müller-Olsen, C., and Simak, M. **X-ray photography employed in germination analysis of Scots Pine (*Pinus sylvestris* L.)** *Medd. SkogsforsknInst., Stockh.* 44 (6), 1954. pp. 19 + 2 plates. 11 refs. [E.e.sw.] Price *Kr.* 1.

Embryo and endosperm qualities of seed from 89 trees in different parts of Sweden and at different altitudes were determined by X-ray photography [cf. *For. Abstr.* 15 (No. 221)] and seeds classified into 5 embryo and 2 endosperm groups (illustrated). A good correlation was found between quality as shown by the X-ray and germination in a Jacobsen germinator. Further experiments on seeds sown in various depths of sand showed that, for all depths of sowing, germination is in direct relationship with embryo qualities, and that the greater the depth, the less the germination for all embryo classes.

3476. Šimák, M., and Gustafsson, Å. Fröbeskaffenheten hos moderträd och ympar av tall. **[Seed properties in Pine parent trees and grafts.]** *Medd. SkogsforsknInst., Stockh.* 44 (2), 1954. pp. 73 + 6 sets of gphs. 41 refs. [Sw.sw.e.] Price *Kr.* 5.

Investigations were made on 6 parent trees from N. and central Sweden and on graft trees at Bogesund, near Stockholm. The grafts produced on average more seeds per cone than the parent trees, but a mathematical analysis showed that for the 4 northernmost genotypes the seed-number/constant-cone-weight in the grafts was below that of the parents and for the 2 southernmost genotypes equal or slightly above that of the parents. In the parents, seed-weight/cone increased with increasing cone weight and decreasing number of seed. This inverse relationship of seed number to seed weight was found also in the grafts. Graft cones gave on average higher seed weights than cones from the parent trees, and seed-weight/constant-cone-weight was higher except for one genotype where grafts were replanted shortly before cone maturity, and X-ray photographs showed damage to the endosperm. A study of X-ray photographs of the seed showed a direct correlation of cone weight, seed number, seed weight and embryo class (based on the degree of development of the embryo). It also showed that poor ripening conditions in N. Sweden in 1952 had caused a predominance of seed with poor embryo development, especially for small cones. Rate of germination was directly related to seed weight and increased with better seed ripening. Seed characters were related either to environment (e.g. seed and wing colour) or heredity (e.g. seed shape). Conclusions drawn are that: (1) the quality of graft seed is superior to that of natural seed, especially in northern genotypes; (2) seed quality improves with more favourable climatic conditions of the parent tree; and with increasing cone weight, especially in northern parent trees; and (3) there is a marked correlation of seed maturity as shown by embryo class with germination % or rate of germination. There is a full English summary and illustrations and tables have English legends.

3477. NAKAMURA, K., GOO, M., and HASEGAWA, S. **[Does the quality of seed change from year to year? An experiment on seeds from the same parent trees of *Cryptomeria japonica*.]** *J. Jap. For. Soc.* 36 (1), 1954 (1–2). [Jap.e.]

An analysis of seed production, volume, weight and germination % for the same trees over several successive years showed that the volume and weight per 1000 seeds were independent of full and fair seed years and that germination % during 6 years was not related to seed production.

3478. REDMOND, D. R., and ROBINSON, R. C. **Viability and germination in Yellow Birch**. *For. Chron.* 30 (1), 1954 (79–87). 11 refs.

Yellow Birch seeds were found to vary in size directly as the strobilus on which they are borne and to increase in size within the strobilus directly as their point of origin is removed from either end. Viability was found to vary from 0% to 34% of the seeds on an individual tree. The best method of determining viability is examination of the embryo following dissection of the seed. A valid test of viability is given by 2,3,5-triphenyltetrazolium chloride, but this is not recommended, because of the small size of the embryos. It is shown that the seed coats contain a water-soluble substance that inhibits growth of the embryos. This substance loses its inhibiting properties when exposed to extended periods of light, but the injury to the embryo is permanent. It is suggested that trees producing few viable seeds in a seed crop may do so because this species is not functionally monoecious and that pollination difficulties would account for a small number of viable seeds on partly isolated trees. *Authors' summary.*

3479. STEGĂROIU, V., and ENESCU, V. Contribuţii la studiul calităţii seminţelor de *Ligustrum vulgare* L. **[The quality of *L. vulgare* seed]**. *Rev. Pădurilor* 68 (8), 1953 (19–23). 8 refs. [Rum.rum.russ.]

Gives absolute weight, purity, germination %, and maximum number of seeds/kg., as established by laboratory tests in Rumania.

3480. ENESCU, V., and STEGĂROIU, V. Analiza calitaţii seminţelor de cătină alba. **[Analysis of the quality of *Hippophae rhamnoides* seed.]** *Rev. Pădurilor* 69 (3), 1954 (114–7). [Rum.rum.russ.]

The seed is divided into two classes, in which absolute weight per 1000 seeds is respectively 4·25 and 3·75 g., germination % 85 and 75, and seeds/kg. 233,000 and 267,000.

232.32. *Plant Rearing. Nursery Practice*

3481. ALEXANDER, J. H. **The forest nursery trade in Scotland, 1854–1953**. *Scot. For.* 8 (2), 1954 (75–84).

3482. **[Nursery technique for Aleppo Pine.]** *Rep. Israel For. Dep. 1952/53*, 1953 (4).

Pinus halepensis seedlings planted out at a density of 16 per tin of 24 × 24 × 13 cm. gave inferior plants to those at a density of 12. Experiments with different soils were in favour of using mountain soil for raising *P. halepensis* and *P. halepensis* var. *brutia* in nurseries.

3483. PHILLIPS, P. J. S. **Note on nursery technique for *Gmelina arborea*.** *Inform. Bull. For. Dep. Nigeria* No. 14, 1954 (1).

Seed is dried in the sun and sown 2–3 months later in July and August during the rains. It is drilled in seedbeds at a depth of ½-in. and 1-ft. spacing. No watering or shading is necessary but beds are lightly hoed in the dry season. Plants are lifted in the following June-July, stumped, and planted in the field.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 3498, 3673, 4215.

3484. **Nutrition problems in forest nurseries.** *Rep. Rothamst. Exp. Sta. 1953*, 1954 (46–50).

In past years some of the benefits from formalin treatment, especially in the older nurseries and on neutral soils, have been ascribed in part to the inhibition of nitrification and the consequent accumulation of NH_3 [cf. *For. Abstr.* 14 (No. 2171)]. Additional evidence on this point was obtained in 1953 from experiments at 6 nurseries, testing 4 alternative forms of N fertilizer supplying 9 g. N/sq. yd.—(*a*) formalized casein applied a month before sowing; (*b*) $Ca(NO_3)_2$, (*c*) "Nitro-Chalk", and (*d*) $(NH_4)_2SO_4$ applied in two summer top-dressings—(1) with and (2) without formalin treatment. In plots without formalin treatment, growth was poor throughout, particularly on (*b*) plots; the superiority of (*d*) over (*b*) was significant in 3 out of 4 experiments, (*c*) being intermediate. Formalin treatment greatly increased growth for all N treatments, and at the poor, established nurseries gave crops resembling those grown in very acid, newer nurseries; but in both cases (*a*) gave much superior results to (*b*), (*c*), or (*d*), possibly due to its supplying N in a wet season before the inorganic fertilizers were given as top dressings. The experiments strengthen the view that conifers profit from receiving their N as NH_4.

In several experiments chlorpicrin injected in Jan. or Feb. 1953 gave improvements similar to those from formalin applied as a drench [cf. *For. Abstr.* 15 (No. 223)]. Earlier application was sometimes better for formalin, but time of application had no effect for chlorpicrin.

3485. VAARTAJA, O. **Mineral deficiencies in a forest nursery**. *Bi.-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (2), 1954 (2).

Application of N in the form of $(NH_4)_2SO_4$ to seedbeds before sowing had little effect on growth of conifer seedlings in N-deficient soil, and no effect on their chlorosis. Application of NH_4NO_3 in liquid form (70–140 lb. N/acre) in August to seedbeds of 3-year-old Spruce gave promising preliminary results; the yellow colour of the foliage rapidly changed to deep green and the buds grew larger.

3486. UCHIDA, T., MATSUMOTO, Y., and TSUDA, K. **[Studies on the effect of three constituents in the fertilizer on the growth of young trees (*Larix leptolepis*).]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (10–6). 3 refs. [Jap.e.]

Height growth increased slightly with increasing N and considerably with increasing P. Maximum green weight was obtained with the addition of 8 kg. N, 14 kg. P and 10 kg. K per tan [0·245 acre] to the soil, and root weight increased with increasing amounts of P. *From authors' summary.*

3487. Whitaker, J. D. **The edge effect in nursery beds.** *J. Oxf. Univ. For. Soc.* (*Ser. 4*) No. 2, 1954 (22–4).

An edge effect in nursery seedbeds of Sitka Spruce was investigated. The outer rows of seedlings tend to be larger and of better colour than seedlings from the centre of the bed, a difference usually attributed to diminished competition for moisture. As a result of the present investigation it is concluded that the superior growth of such marginal seedlings can be interpreted in terms of an improved N nutrition. Conversely, the severe competition for N inside the bed reduces seedling growth there and, in the absence of any marked change in the Fe or Mn uptake by the plant, leads to corresponding accumulation of these elements in the tissues. When the roots of the outer plants were cut so as to cut off all connexion with the soil outside the bed, there was an apparent diminution in competition within the bed, and the better nutrition of the inner seedlings was shown by their higher N concentrations. The inversion of the N gradient in the bed after root cutting arose mainly from an abnormal fall in the N concentration of the outer seedlings, but the cause of this fall is obscure.

3488. Feliciani, A., and Montefiori, R. Allevamento in vivaio di *Pseudotsuga douglasi* e colonizzazione micorrizica delle piante. **[Raising *Pseudotsuga taxifolia* in the nursery, and mycorrhizal infection of the plants.]** *Monti e Boschi* 5 (5), 1954 (215–7). [It.f.e.]

Discusses the possibility of mycorrhizal fungi becoming pathogenic when conditions are unfavourable to the vigour of seedlings, and describes a diseased condition of the roots (fungus unidentified) suggestive of such a possibility.

3489. Uemura, S. **[Studies on leguminous trees and their root nodule bacteria. (1). Effects of seed inoculation on the growth of some *Acacia* seedlings. Preliminary report.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (203–14). 6 refs. [Jap.jap.e.]

The following results were obtained with *Acacia decurrens* var. *mollissima*: (1) Pot tests: (*a*) in both fertilized and unfertilized soils, inoculation with *Rhizobium* increased seedling growth and the number of root nodules; (*b*) in untreated soil, seedling weight 103 days after sowing averaged 1·0 g., in soil given a fertilizer treatment 3·8 g., and in soil given fertilizer + inoculation 13·5 g. (2) In field tests on *A. dealbata*, *A. melanoxylon* and *A. decurrens* var. *mollissima*, seedlings in untreated plots showed poor, and those on inoculated plots vigorous and even growth. *From author's summary.*

232.323. Sowing and Covering

See also Nos. 3464–6, 3468, 3762.

3490. Takatoi, M. **[Soil covering on seedbeds of Todo Fir and Ezo Spruce.]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (51–9). [Jap.jap.e.]

A soil consisting of 75% sand and 25% clayey loam gave best germination of both species. A volume of 2·5 litres/sq. m. gave best results for *Abies mayriana* and of 7·5 litres for *Picea jezoensis*. *From author's summary.*

232.324. Transplanting and Lining Out, including Grading of Seedlings

3491. Mannozzi-Torini, L. La tavoletta Pons per i trapianti in vivaio. **[The use of the "tavoletta Pons" planting board for transplanting in [forest] nurseries.]** *Monti e Boschi* 5 (6), 1954 (254–9). [It.f.e.]

Illustrated by 9 photographs.

3492. Lanquist, K. B. **Seedling harvester.** *Tree Plant. Notes* No. 16, 1954 (5–6).

Describes (with photo and diagram) a machine developed at the Shasta Nursery. It seats 4–5 pickers who pull, grade and count (25 or 50 to the bunch) the seedlings and put them on a conveyor belt which carries them to 2 packers.

3493. Dickman, I. **Ohio nursery develops six-row transplanter.** *Tree Plant. Notes* No. 16, 1954 (8).

An adaptation of the 5-row transplanter developed earlier at the Soil Conservation Nursery, Zanesville, Ohio [cf. *For. Abstr.* 11 (No. 1016)]. A 6-row transplant bed is usual and if this bed is reduced to 5 rows, it requires an additional 20% of land to transplant the same number of trees. Detailed plans can be obtained for $1.00 from the Department of Natural Resources, 1500 Dublin Road, Columbus 12, Ohio.

3494. Smack, L. C. **Construction costs for a grading table.** *Tree Plant. Notes* No. 16, 1954 (21–2 + 1 photo + 1 dgm.).

Gives materials and costs (1951 in U.S.A.) for constructing a table and conveyor belt for grading planting stock.

3495. Rubţov, S. Metoda pentru evaluarea producţiei de puieţi in pepinierele silvice. **[A method of evaluating the yield of seedlings in forest nurseries.]** *Rev. Pădurilor* 68 (5), 1953 (19–22). [Rum.rum.russ.]

Describes the use of the calipers designed by the author [cf. *For. Abstr.* 14 (No. 2175)] in making enumerations of the seedlings in nursery beds and simultaneously classifying them by quality classes.

3496. Takatoi, I., and Tukada, T. **[Experiments on the rapid cultivation of tree seedlings. (I.) The growth of Todo Fir and Japanese Larch seedlings in frame nurseries. (II). The relationship between growth of Todo Fir and Japanese Larch seedlings and times of transplanting.]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (67–84). [Jap.jap.e.]

(I). Seedling % and growth were higher for *Abies mayriana* with screens on the S. side and for *Larix leptolepis* with screens on the N. side. For the latter, seedling size was greater at densities of 500 than of 1000/sq. m. but the % of seedlings over 30 cm. high was greater at 100/sq. m. (II). Best results were obtained for seedlings sown in 1950, 1951 and 1952 by transplanting on 4 July.

232.325. Tending (in both Seedbeds and Transplant Beds)

See also No. 3468.

3497. Mony, C. C. **Vallonia rotary tooth cultivator.** *Tree Plant. Notes* No. 16, 1954 (17–20).

Specification and plans of a cultivator for use on 5- or 8-row hardwood nursery beds, developed at the Vallonia Nursery, Indiana.

3498. Lanquist, K. B. **Use of overhead irrigation lines to apply liquid fertilizers and weedicides.** *Tree Plant. Notes* No. 16, 1954 (2–4).

Describes (with diagram) a method of applying liquid chemicals (herbicides, fertilizers etc.) to nursery beds by injecting them directly into the overhead sprinkling lines.

3499. Seymour, W. **Weeding a forest nursery: some notes on the use of sprayers.** *J. Land Agents' Soc.* 53 (5), 1954 (204–5).

Spraying of conifer transplant beds with white spirit cost only 2*s.* 8*d.*/1000 plants compared with 20*s.* 6*d.* for hand weeding and gave good control of weeds. Pre-emergence spraying with T.V.O. [tractor vaporizing oil] gave considerable saving of weeding at a very low cost. Experimental spraying of transplants (Oak, Beech, and Tamarack Larch) with T.V.O. indicates that, with great care to keep the spray low and not to touch the foliage, it may be used for this purpose also.

3500. Bylterud, A. Sprøyteutstyr for skogplanteskoler. **[Spraying equipment for forest nurseries.]** *Årsskr. norske Skogplantesk. 1953*, 1954 (14–24). [Nor.]

Discusses different types of equipment (illustrated) used in Norway for foot and tractor spraying to control weeds.

3501. Børset, O. Forsøk med hormonpreparater mot ugras og lauvtreteinung i plantefelter. **[Trials of the use of growth regulators in controlling weeds and deciduous trees in nurseries.]** *Tidsskr. Skogbr.* 62 (4), 1954 (176–85). [Nor.] [Skogbrukets og Skogindustrienes Forskningforening, Råstoffutvalget.]

Plots were sprayed with 2,4,5-T/2,4-D ester (at rates of 300 and 600 g./dekare), Agroxone [MCPA] (250 and 500 g.) and 2,4,5-T ester (300 and 600 g.) Results 1 year after spraying showed that small Spruce (20–25 cm.) were not damaged, while the shoots of larger plants (1½–2 m.) were damaged; Birch and Alder were killed on all plots, and *Sorbus aucuparia* by the esters; bracken was killed by the 2,4,5-T/2,4-D ester at 600 g., but was otherwise undamaged; all grass species were resistant; *Epilobium angustifolium* was completely killed on the plot sprayed with the 2,4,5-T/2,4-D ester and effectively controlled on the others; *Aconitum septentrionale* was severely damaged by 2,4,5-T and *Filipendula ulmaria* was killed by the larger dose of 2,4,5-T; *Rubus idaeus* was unaffected by any of the chemicals; and *Galeopsis tetrahit*, *Solidago virgaaurea*, *Stellaria nemorum* and *Campanula latifolia* were resistant. Further experiments were made with Weedone 2,4-D ester at different concentrations and amounts of liquid against different woody species. Hazel, Alder, Birch and Willow were almost entirely killed by 150 g. effective chemical/dekare; results for *Prunus padus* were slightly less good. Aspen and *Sorbus aucuparia* were killed or damaged by 300 g./dekare. There was considerable damage to Oak, *Rhamnus frangula*, and *Viburunum opulus*, but these species cannot be controlled by reasonable amounts of Weedone. Ash and Norway Maple appeared to be resistant. Needles of Spruce and Pine turned brown but the trees did not appear to be significantly damaged. Amounts of liquid can be reduced to 12–15 litres/dekare if the spray is fine enough; amounts of 50 litres/dekare are unnecessarily large. Results are tabulated.

3502. Robak, H. Litt om årsakene til dårlig overvintring hos japansk lerk i kystplanteskolene. **[The reasons for poor winter survival of *Larix leptolepis* in nurseries on the coast.]** *Årsskr. norske Skogplantesk. 1953*, 1954 (34–40). [Nor.]

In summer 1952, seedlings sown on 15 May were given short-day treatment, by covering frames erected in these seedbeds from 9 p.m. to 7 a.m. between 10 July and September. In April 1953 the 4 short-day plots contained 51·5–75·7% plants with the terminal bud formed and clearly visible, while in the control plots no plants had visible buds. A later examination showed that 43·7–73·6% of the plants on the short-day plots had survived the winter, against 0·4% in the rest of the seedbed; the actual number of plants surviving was 602 in the short-day plots (total area 1·2 sq. m.) and 149 on the remaining 22·8 sq.m. of seedbed. In 1953, seeds were sown on 23 May and, from 30 June, plots were covered from 9 p.m. to 7 a.m. (1) with a completely darkened frame, (2) with a frame having a plexiglass cover or (3) with a frame having side pieces and no cover. Control plots (4) had no form of shelter. By 18 Aug., 47·3% of seedlings in (1) and none from other plots had visible terminal buds; by 28 Sept. the figures were (1) 100%, (2) 27·1%, (3) 14·1% and (4) 8·0%; by 15 Oct. (2) 92·0%, (3) 76·5% and (4) 18·9%, and by 20 Nov., after an unusually long mild autumn (2) 98·5%, (3) 96·7% and (4) 72·3%. The possible application of these results in practice is discussed.

232.327. Protection Measures in Nurseries

See also Nos. 3457, 3463, 3496, 3680, 3716–8, 3720, 3838–40.

3503. Cocalcu, T. Să umbrim semănăturile de pin? **[Should Pine seedlings be shaded?]** *Rev. Pădurilor* 68 (3), 1953 (32–3). [Rum.rum.russ.]

From experience with *Pinus nigra*, *P. ponderosa*, and *P. sylvestris*, the writer concludes that all do better in unshaded than in shaded nursery beds.

3504. Bălănică, T. Se pot prevedea ingheţurile târzii in pepiniere şi combate efectele lor? **[Can one forecast late frosts in nurseries and combat their**

effects.] *Rev. Pădurilor* 68 (3), 1953 (20–4). 7 refs. [Rum.rum.russ.]

Describes the use and collection of meteorological data, a thermostatic alarm and possible measures against frost, e.g. hardening the plants off, using late-flushing varieties, ensuring adequate air drainage, smoke fires etc.

3505. NOHARA, Y., and ZINNO, Y. **[A mist sprayer for forest nurseries.]** *J. Jap. For. Soc.* 35 (3), 1953 (93–6). 4 refs. [Jap.jap.]

Report on trials of a new nursery mist sprayer made by the Kyoritzu Manufacturing Co., in collaboration with the Forest Experimental Station, Tokyo. It weighs 95 kg. (chassis 22 kg.), with a liquid capacity of 54 litres which its 2·7-h.p. petrol engine can project to a distance of 20 m. It is claimed to be easier and more economical to operate than other Japanese machines, with which its performance is compared in a table.

3506. NOHARA, Y., and ZINNO, Y. **[Experiments on controlling damping-off of conifer seedlings. III. The effect of treating the soil with pyroligneous acid.]** *J. Jap. For. Soc.* 36 (2), 1954 (31–7). 7 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 13 (No. 2940).] In experiments at 3 forest nurseries, this treatment gave very good results, especially if seedlings were sprayed with Uspulun (an organic Hg compound) when damping-off was severe. Soil treatment with Uspulun or H_2SO_4 was less effective. The best effects were obtained using undiluted pyroligneous acid at a rate of 8 litres/sq. m. This concentration was harmless to seedlings but suppressed growth of grasses. *From authors' summary.*

232.328. Vegetative Propagation

See also Nos. 3257–60, 3544.

3507. MCCLURE, F. A., LLAVAT-CRISTY, F., and KENNARD, W. C. **Bamboo propagation.** *Rep. fed. Exp. Sta. Puerto Rico 1952/53*, 1953 (9).

Propagation by means of cuttings of rhizomes found near the soil surface round clumps of many species has proved to be a reliable, though not prolific, source of small rooted plants. The cuttings should be obtained at the end of the dry season before the buds have begun to push. Losses of *Bambusa tuldoides* and *B. textilis* were reduced by dipping the freshly dug rhizomes for 5 minutes in a 3% solution of commercial chlorox and then sealing the cut ends with melted paraffin. Layering was ineffective with *Dendrocalamus strictus* and *B. tulda*, but successful with *B. longispiculata* from which small, rooted culms were obtained after 9 months.

Propagation of *Arundinaria amabilis* (used for fishing rods) has proved very difficult. The most dependable way of increasing this species is by heavily fertilizing the mother plant and dividing the rhizome system once a year at the end of the dry season.

The most satisfactory means of propagating several of the Bamboo species is by whole culm cuttings. The oldest material gives the best results provided that viable buds are present; culm cuttings should be put in as near to the rainy season as possible; special care should be taken to prevent drying of the culms or their buds before planting.

3508. DAMAČEĂNU, C. Stabilirea metodelor de inmulţire a speciilor de *Euonymus* prin butaşi şi drajoni. **[Vegetative propagation of *Euonymus* [*verrucosus* and *E. europaeus*] by cuttings and layering.]** *Rev. Pădurilor* 68 (2), 1953 (15–18). 9 refs. [Rum.rum.russ.]

3509. **Vegetative reproduction [of *Araucaria cunninghamii*].** *Rep. Dir. For. Qd. 1952/53*, [1953?] (9).

Leading shoots of young *A. cunninghamii* can be struck as cuttings with over 90% success. With older trees results are not promising with branch or leader cuttings and work is now being done on root cuttings.

3510. TODA, R. **[The region of the crown from which cuttings should be collected.]** *J. Jap. For. Soc.* 35 (6), 1953 (184–6). 8 refs. [Jap.e.]

Cryptomeria cuttings collected in 1948 from six 15-year-old trees rooted more easily when taken from the lower part of the crown. In 1949 cuttings were collected from trees of 12 native races. Cuttings from 4 races rooted better when taken from the lower, and from another 4 when taken from the upper part of the crown, while with the remaining 4 there was no significant difference. [Results are shown in graphs with English legends.] *From author's summary.*

3511. SATOO, S. **Origin and development of adventitious roots in greenwood cuttings of *Metasequoia glyptostroboides*.** *J. Jap. For. Soc.* 35, 1953 (157–60). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo No. 3, 1952/53*, 1954 (77). [E.]

Almost all adventitious roots arose from the primary ray tissues between the outer part of newly formed xylem and phloem regions. No callus roots were found. Only one root meristem was found in callus tissues, as a group of meristematic cells connected with the differentiating callus xylem.

3512. SATOO, S. **[Origin and development of adventitious roots in *Thujopsis dolabrata* cuttings].** *J. Jap. For. Soc.* 35 (7), 1953 (220–5). 3 refs. [Jap.jap.e.]

Adventitious roots arose from stem tissues near the cut and from callus tissue. Most roots from stem tissues were initiated in the cells of the phloem region of the primary ray tissues immediately below the leaf trace and the others from the leaf trace itself. Roots from the callus tissues developed as a group of meristematic cells in connexion with the differentiating callus xylem. One root seemed to arise from the parenchyma phloem layers connecting with newly-formed xylem near the cut base. Distribution of root primordia among the tissues and the increase in the number of primordia and roots from the 10th to the 64th day after planting are shown in tables. [Tables and illustrations have English legends.] *From author's summary.*

3513. HYODO, M. **[Stem cuttings of *Robinia pseudoacacia* var. *bessoniana* treated with Rootone and α-naphthalene sodium acetate.]** *Bull.*

For. Exp. Sta., Meguro, Tokyo No. 65, 1953 (57–9). [Jap.e.]

Cuttings were (1) soaked in 0·01% solution of Na α-naphthyl acetate for 12 hr. before planting or (2) treated with Rootone, a powdered growth regulator, just before planting. Examination 10–12 weeks after treatment showed that (1) gave better results than (2) at 5% level.

3514. Cunningham, F. E. **Rooting ability of native Cottonwoods depends on the clone used.** *For. Res. Note Ntheast. For. Exp. Sta.* No. 26, 1953. pp. 2. 1 ref.

Rooting % for cuttings from 30 clones of *Populus deltoides* ranged from averages (of 4 replicates for each clone) of 3 up to 100%. Rooting for 30 clones of hybrid Poplars ranged from averages of 92 to 100%.

3515. Ouellet, C.-E. L'influence du facteur lumière dans la multiplication de l'orme d'Amérique par la bouture de rameaux feuillés. **[The influence of the light factor in propagating American Elm by means of cuttings in leaf.]** *Revue d'Oka, La Trappe* 27 (6), 1953 (172–4). [F.] A.P.B.

Experiments were made at the Station Expérimentale Fédérale, L'Assomption, Quebec, in rooting American Elm cuttings under glass at high humidity and at various light intensities. The findings show that (1) American Elm will root at very low light intensities, (2) the lower light intensities give better results in most cases than substantially higher ones, and (3) in some cases high light intensities give good results but not better than those obtained at low intensities. It is supposed that the reduced light decreases the use of moisture by the plant and helps it to retain its turgor.

3516. Wells, J. S. **Open bench grafting.** *Amer. Nurserym.* 99 (7), 1954 (13, 83–7).

Nurserymen have usually considered it necessary to glass-in the greenhouse benches on which they are raising grafted stock. The author has found this system of double glass both unnecessary and unsatisfactory, and describes his own method of working on open greenhouse benches with high humidity produced by overhead fog lines. [Cf. *For. Abstr.* 15 (No. 2459).]

3517. Garavel, L. Enquête sur le comportement du noyer noir d'Amérique en tant que porte-greffe des variétés de noyers indigènes. **[An inquiry into the behaviour of *Juglans nigra* as a stock for grafting varieties of *J. regia*.]** *Rev. for. franç.* 6 (4), 1954 (217–24 + 3 photos). [F.]

The American species *Juglans nigra* has been widely used in France as a stock for grafting *J. regia*. The growth of the scion is very rapid and fruiting is precocious and abundant. It now appears, however, that these desirable qualities are followed, 20–25 years after grafting, first by a gradual failure in vigour and then by rapid die-back. The author examined a number of Walnut orchards and established the following facts: (1) Ungrafted, well established trees of *J. nigra* do not die back. (2) Scions grafted on to *J. nigra* die at 20–40 years (most often between 25 and 30 years) after grafting. (3) This die-back is general and appears to be independent of environmental factors (soil, climate, vicinity of diseased trees), of the variety grafted, and of the position of the graft (root, collar, crown). (4) The die-back seems not to be contagious. (5) The stock sometimes survives, only the scion dying. Further research showed that lack of rooting depth was not responsible, but that the root systems of affected trees often displayed a considerable degree of necrosis though there was no sign of the presence of any fungus, e.g. *Phytophthora*. The author's explanation of this phenomenon, which is also reported from America in reference to *Carya* spp. as well as *Juglans*, is that grafting on to *J. nigra* in some way stimulates the growth and development of the scion, but correspondingly shortens its life. He suggests that trees showing preliminary symptoms of the disorder (diminished elongation of shoots, sparse and chlorotic foliage, abnormal leaves) might perhaps be saved by severe lopping, adducing as evidence a grafted tree, 47 years old, which has been lopped annually to provide a nursery with scions, and is still vigorous.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

See Nos. 3527, 3602, 4251.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 3416, 3541, 3553, 3578, 3768.

3518. Tirén, L. Jämförelser mellan olika såddmetoder. **[Comparison between different sowing methods.]** *Medd. SkogsforsknInst., Stockh.* 43 (9), 1953. pp. 83. 3 refs. [Sw.sw.e.] Price *Kr.* 4.

[Cf. *For. Abstr.* 14 (No. 1166).] Data from N. Sweden on sowing by various methods were analysed statistically, and success, based on the number of plants per patch as compared with square patch sowing, was determined. Results include the following: strip sowing gave roughly the same results as square patch sowing; 'scratch' sowing and 'gully' sowing were inferior to square patch sowing on unburnt sites but equal or superior on burnt sites; 'border' sowing was generally inferior or equal to square sowing; 'strew' sowing with a suitable cover material was superior on both burnt and unburnt sites; and surface sowing, 'knife' sowing and 'hook' sowing gave poor or uneven results and are not recommended [all these methods are defined in a detailed English summary to the previous article]. As regards height growth after 5 years, square and strip sowing were about equal, scratch sowing was comparable on burnt but inferior on unburnt sites, strew sowing gave greater height growth for both Pine and Spruce on burnt and unburnt sites; and gully sowing gave good results on burnt but not on unburnt sites; other methods were inferior. Height growth of the highest plant after 5 growing seasons increased with the number of plants per patch up to a limit, for Pine ranging from 40 to 60 trees/patch and for Spruce about 30 trees/patch. Preliminary measurements after 10 years are also discussed. Application of fertilizers in 1947 stimulated height growth of Pine on burnt and Spruce on unburnt sites but not of Pine on unburnt sites; application in 1948 had no effect on height growth. Figures are given showing the slower growth of Spruce as compared with Pine over the 10-year period. Preliminary results on the effect of burning are discussed. There is a full English summary, graphs and tables have English legends.

3519. Roy, D. F., and Schubert, G. H. **K-screen seed spots**. *For. Res. Note Calif. For. Range Exp. Sta.* No. 88, 1953. pp. 2.

Further improvements are needed before the screens, cylinders of 8-mesh hardware cloth, can be recommended. A more detailed account can be obtained from the Director, California Forest and Range Experiment Station, P.O. Box 245, Berkeley 1, California.

3520. Minckler, L. S., and Chapman, A. G. **Direct seeding of Pines in the central hardwoods region.** *Tech. Pap. Cent. St. For. Exp. Sta.* No.140, 1954. pp. 20. 5 refs.

In experiments in Ohio and Illinois, spot-sowing proved generally unsatisfactory. In general, best results were obtained on northerly slopes with a moderate cover of perennial grasses and annual herbs and partly shaded. Frost heaving caused heavy mortality but could be reduced by applying a light mulch after sowing. Sowing in furrows was successful on experimental plots carrying broomsedge or broomsedge and light brush and with mixed broomsedge and annual weeds and grasses. Frost-heaving losses were kept down by a natural accumulation of mulch material in the bottom of the furrows. Pilot tests of machine sowing in furrows showed very uneven results. Recommendations for the two methods are made.

3521. Hart, A. C. **Hardwoods now predominate on burn at Centerville, Maine.** *J. For.* 52 (5), 1954 (360–1). 1 ref.

By the end of the second growing season, *Pinus strobus* sown from the air [see *For. Abstr.* 11 (No. 999)] at 5000 seeds/acre had failed. Made after an exceptionally dry year, the sowings were followed by an even drier 4-month period. Ca. 3·5% germinated as estimated from milliacre counts.

3522. Gartz, J. F. **The modified Cyclone seeder as an aid in obtaining uniform seed dissemination in direct seeding**. *Res. Note Ore. Bd. For.* No. 14, 1954. pp. 2 + 4 dgms.

Methods of adapting and using a machine designed for sowing agricultural seed, for direct sowing of forest tree seed.

3523. Defour, B. Semănătoare manuală de ghindă in cuiburi. **[A hand-tool for nest-sowing of acorns.]** *Rev. Pădurilor* 68 (3), 1953 (46–7). [Rum.]

Illustrated by scale drawings.

232.4. Formation of Stands by Planting

See also Nos. 3416, 3541, 3578.

232.41. *Planting Stock (Type, Handling and Treatment)*

See also Nos. 3448, 3494, 3544, 3762.

3524. Mocanu, V. Plantaţii cu puieţi de diferite vârste pentru stabilirea vârstei optime de plantare. **[Experimental planting with stock of different ages in order to determine optimum age of planting.]** *Rev. Pădurilor* 69 (1), 1954 (45–6). [Rum.]

Pinus nigra seedlings 1, 2, and 3 years old were planted out in May and measured in the following Sept., when % establishment for the 3 classes was respectively 93, 98, and 81, and mean height increment 3, 9, and 4 cm. The use of 1- to 2-year-old stock is recommended.

3525. Kędzierski, Z. Badania nad rozwojem na uprawach sadzonek sosnowych różnej jakości. **[Investigations on the development of Pine plants of different quality in plantations.]** *Roczn. Nauk leśn.* 1, 1953 (5–42). 6 refs. [Pol.pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 99).

Growth analyses carried out in 1948–51 in Poland on many thousands of one-year seedlings of *Pinus sylvestris* point to the advisability of classifying them into strong seedlings (Y_I) with stem length exceeding 5 cm., and weak seedlings (Y_{II}) with shorter stems. Both of these main groups were further subdivided into unbranched seedlings (Y_0), seedlings with one (Y_1), two (Y_2), and more than two (Y_3) branches. Statistical analysis of the results obtained shows that: (1) differences in growth rate between the main groups are distinct and persistent; 4 years after planting, the height of Y_I was 17% greater than that of Y_{II}; (2) the % mortality in Y_I was about half that in Y_{II}; (3) within Y_{II}, average seedling height increased from Y_0 to Y_3, this trend being less evident within Y_I; (4) the % mortality was less for Y_2 and Y_3 than for Y_0 and Y_1. It is recommended that the four sub-groups should be maintained only for Y_{II}, while Y_I should be divided into Y_{0-1} (none or one branch) and Y_2 (more than one branch). [Cf. *For. Abstr.* 15 (No. 2477).]

3526. **Semal and other softwood species.** *Rep. For. Res. Madhya Pradesh 1951/52*, 1954 (4–5).

Preliminary report on an experiment in regenerating Semal [*Bombax malabaricum*] by clear felling, burning slash, and planting stump plants at stake at a spacing of 30 × 30 ft. in prepared pits (1½ × 1½ × 2 ft.) filled with forest soil and leafmould and lightly manured. Early results were very satisfactory.

3527. Downs, J. A. **Square pots for transplants**. *Tree Plant. Notes* No. 16, 1954 (10–6).

Describes, with photos and scale plan, a potting bench developed at Albuquerque Soil Conservation Service nursery, New Mexico, for potting up Pine transplants in tarpaper for transport to the field. Four men are required to man one potting bench, two actually pot the plants and two keep them supplied with paper, plants and soil and carry away the trays of potted plants. Cost of material and labour is ca. $35/1000.

3528. Fowells, H. A., and Schubert, G. H. **Planting stock storage in the California Pine region.** *Tech. Pap. Calif. For. Range Exp. Sta.* No. 3, 1953. pp. 12. 6 refs.

Planting stock of *Pinus ponderosa*, *P. jeffreyi* and *P. lambertiana* was used. Stock stored 2, 4 and 6 weeks (*a*) in a cold cellar, (*b*) heeled in, and (*c*) in a refrigerator at 41° F., in spring, survived satisfactorily; stock similarly stored in autumn showed some decline in survival after 4 weeks' storage and a serious decline after 6 weeks. Reasonably satisfactory survival (81%) was obtained from stock stored for 4¼ months during the winter at 38°, 91% for stock heeled in for the same period and 94–96% for stock planted directly, which also grew faster than the stored trees. Optimum storage temperature appeared to be about 36° and there was no survival of stock stored at 23 and 0°. Vermiculite and peat moss as packing gave rather better results than sawdust and shingle tow. Grading by size or by presence of a hard winter bud did not lead to substantial differences in survival. Exposing the plants to 55° for 1–2 weeks before planting did not improve survival.

3529. **Maleic hydrazide inhibits seedling growth in south Mississippi.** *Rep. Sth. For. Exp. Sta. 1953*, 1954 (15).

Seedlings of Slash Pine were sprayed in the nursery bed in December and/or February with maleic hydrazide at concentrations ranging from 0·13 to 0·39%, in the hope that delaying initiation of new growth might improve early survival particularly on dry sites or during dry seasons. Growth on unsprayed seedlings started 6 weeks and on sprayed ones 10 weeks after planting in February. Eleven weeks after planting, 95% of the untreated seedlings survived and had 2·3 in. terminal growth. Seedlings sprayed in Dec. or Feb. survived as well as the untreated ones but averaged only 0·3 in. new growth. Those sprayed in late Dec. and Feb. averaged 85% survival and had no new terminal growth.

232.42. *Methods of Planting* (*including Use of Fertilizers etc.*)

See also Nos. 3553, 3841.

3530. Wempe. Sanddeckkulturen im Forstamt Knesebeck. **[Planting with a sand mulch in Knesebeck Forest District.]** *Forst- und Holzw.* 9*A* (6), 1954 (119–22). [G.]

Methods and costs of this form of mulching, as carried out in Knesebeck. Some of the advantages of a sand mulch on sites that are transitional between peat and mineral soil are the prevention of waterlogging and frost heaving and the diminution of frost danger by raising the plants above the level of the grass cover.

232.43. *Spacing and Arrangement in Plantations*

See also No. 3749.

3531. Braathe, P. Planteavstandens virkning på bestandsutvikling og masseproduksjon i granskog. **[The effect of plant spacing on stand development and yield in Norway Spruce forests.]** *Medd. norske Skogforsøksv.* 11 (2) (No. 39), 1952 (425–69). 18 refs. [Nor.nor.e.]

Plots were laid out in 1949 in a stand with initial spacings of 1·25 × 1·40, 1·40 × 1·65, 2·0 × 2·0, 3·0 × 3·0 and 3·5 × 3·5 m., and ages ranging from 44 to 48 years. By the time of the investigation, thinnings (in 1940, 1943, 1946 and 1949) had considerably reduced the difference in numbers on the different plots. Two (1·25 × 1·40, and 3·0 × 3·0) showed consistently greater mean height; one was on a slightly sloping site and the other on especially good soil. There is no real evidence of variation in height with spacing. The plots with the widest spacings showed the highest crown ratio. Diameter increment on all plots was high (annual-ring width 4–6 mm.) until the stands closed, when it decreased rapidly, increment then being approximately the same in all plots, regardless of original spacing. The main-crop basal area (after thinnings) was largest on the two plots with the widest spacings, but their b.a. increment was lowest. As in all previous experiments, total volume produced per ha. was greatest in the densest plots, the difference being established before the first thinning. Much of the greater yield was removed in the first 3 thinnings, most of it in small dimensions. Taper was least on the closely-spaced plots but decreased rapidly on the more widely-spaced ones after the stand closed. Graphs and tables have English legends. [Cf. *For. Abstr.* 14 (No. 3338).]

3532. **Free growth experiments.** *Rep. Dir. For. Qd. 1952/53*, [1953?] (9).

Gives a table showing the numbers of stems/acre no longer free-growing at various ages, for *Pinus taeda*, *P. elliottii* and *Araucaria cunninghamii*. The *Araucaria* enters the zone of suppression at a later age than the other two species. The normal planting spacing of 8 × 8 or 9 × 8 ft. cause all three species to enter the zone at a very early stage.

3533. Wholey, J. W. **The effect of planting distances on the growth and yield of *Terminalia ivorensis*.** *Inform. Bull. For. Dep. Nigeria* No. 16, 1954 (1–4).

A comparison is made of two sample plots, Nos. 78 and 12. The volume production/acre of the first 6 years (not concurrent) was ca. 1800 cu. ft. each. They enjoy 47 and 78 in. annual rainfall and lie respectively on sandy loam over clay-with-gravel and on Benin sand. Spacing is 13½ and 8 ft. The heights (ft.) and girths (in.) of main crop and thinnings were:—plot 78, 63/24 and 53·2/19·5; plot 12, 48/20 and 32·5/12. The better individual growth of plot 78 is ascribed to wider spacing, which is preferred since small thinnings are unsaleable.

3534. Herbignat, A. Avis aux planteurs de peupliers: distances à adopter dans les plantations. **[Advice on planting Poplars: spacing in plantations.]** *Bull. Soc. for. Belg.* 61 (2), 1954 (92–107). [F.]

From a review of a number of plantations with different spacings, the following conclusions are drawn: (1) Dense plantations (5 × 5 m. and less) are to be avoided. (2) Plantations for the production of small or medium peeler logs at 20–25 years may be spaced 6 × 6 or 7 × 7 m. but such plantations of *Populus robusta* have been observed to show the ill effects of crown competition as early as 12 years. (3) The spacings recommended are 8 × 8 to 10 × 10 m. in uniform stands, 9 × 9 or 10 × 10 m. for coppice with standards, and not less than 5 m. in single or double rows.

232.5. Artificial Formation of Stands by Vegetative Propagation

See also Nos. 3536–7.

3535. Cunningham, F. E. **Methods of establishing plantations of hybrid-Poplar cuttings.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 66, 1954. pp. 10. 10 refs.

Practical instructions.

233. *Afforestation*

See also Nos. 3190, 4407.

3536. Damke-Hornburg. Pappelanbau auch auf Stein- und Geröllhalden. **[Planting Poplars on quarry spoil mounds and boulder banks.]** *Forst- und Holzw. 9A* (6), 1954 (122–3). [G.]

A method of planting Poplar cuttings by making openings in the soil with a sharpened pole. After planting the hole is filled with mud containing humus and then covered with rubble.

3537. Günther, H. Weidenanbauversuche auf diluvialem Sand und auf Braunkohlenabraumkippen. **[Establishing Willow on diluvial sand and on lignite-mine spoil mounds.]** *Dtsch. Landwirtsch.* 5 (2), 1954 (102–6). [G.]

A progress report on plantations established in 1947 on diluvial sand and in 1952 on a spoil mound, giving data on phenology and the growth of different species and races.

3538. Clark, F. B. **Forest planting on strip-mined land in Kansas, Missouri and Oklahoma.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 141, 1954. pp. 33. 10 refs.

In a species-suitability test, results 6 years after planting suggest that *Fraxinus pennsylvanica* var. *lanceolata*, *Juglans nigra*, *Juniperus virginiana*, *Platanus occidentalis*, *Quercus macrocarpa*, *Robinia pseudoacacia*, *Populus deltoides*, and *Prunus serotina* will do well in suitable conditions. Mortality was insignificant after the first growing season. Survival was poorest in bottoms and on ridge-tops and best on N- and E-facing slopes. The average survival of all species after the first growing season was best in areas where 41–60% of the ground was covered with natural vegetation and poorest where less than 20% was covered. Acidity is of primary importance and areas with toxic acidity (pH 4·0) must be avoided. Areas with a high % of small soil particles are more subject to erosion and should be allowed to stabilize 2–5 years before planting. Survival, growth and moisture relations were better on undisturbed than on graded banks. Tentative recommendations are made on spacing and planting methods, post and Christmas tree plantings, and mixed plantings.

3539. Arany, S. Adatok a tiszai hullámterek talajviszonyainak megismeréséhez. **[Data characterizing soil conditions in Tisza flood soils.]** *Erdö* 2 (1), 1953 (19–41 + 2 dgms). 10 refs. [Hung.]

The author presents analysis and profile characteristics showing that these soils do not develop into regular types but consist of superimposed layers of very variable composition and structure. The soils are generally lacking in lime and humus and their pH values and base status vary with the degree of weathering; the inadequate aeration and impermeability of the more compacted layers may lead to toxic accumulations of soluble salts and Fe and to gley formation. Comprehensive soil surveys should therefore precede the selection of species for afforestation. Soil profiles for 3 Poplar stands of varying vigour are included.

3540. Babos, I. Hullámtéri tapasztálatok. **[The afforestation of flood areas.]** *Erdö* 2 (1), 1953 (3–18). 5 refs. [Hung.]

Systematic work on the afforestation of flood areas in Hungary was begun in 1951, topographical surveys being followed by soil examination (now compulsory for flood areas) correlated with botanical surveys. Results of the soil work, collected from 776 separate examinations throughout the Great Plain, clearly show that the degree of soil compaction is the governing factor in afforestation; in only 35 cases was a harmful degree of alkalinity recorded. The author proposes, and presents in a table, a working classification of Hungarian flood soils into 12 classes, based on the degree of compaction at various levels, using S. Arany's compaction index numbers, and suggests for each class and locality what proportions of the chief afforestation species—hybrid Poplar, common Poplar species and *Quercus robur*—should be tried. Deep ploughing can help only on the least compacted soils (classes I and II). On the others, planting Oak offers one method of breaking up the lower compacted layers and is therefore recommended despite the country's need for faster growing species. The heavier the soil the higher the % of Oak. The author presents detailed schemes for planting mixed stands in various flood areas of the Tisza, Maros and Sajó rivers and gives data for existing stands on such areas in support of his proposals. He points out the need for research (now in progress) into the degree to which various species will tolerate flood water and cites provisional official figures: hybrid Poplar 4 weeks; common Poplar and *Q. robur* 6; *Fraxinus excelsior* 3; *Juglans nigra* 2; Robinia 1–2 days. Some data are given on the extent of flooding in Hungary and on plant indicators for afforestation. Thus *Glyceria maxima* and its associates point to a duration of flood water precluding tree planting; *Carex gracilis* and its associates indicate that only Willow can be grown; *Alopecurus pratensis/Carex nutans* justify planting *P. marilandica*; *C. praecox/A. pratensis* justify the common Poplars and *Q. robur*. Recommendations are made for the 1953 afforestation programme in the light of revealed deficiencies in the supply of planting stock and tending; 80% of the May 1952 sowings of Poplar were lost because watering was neglected.

3541. Pamay, B. Dursunbey-Alaçam orman mıntıkasındaki yangın sahalarının ağaçlandırılması imkânları ve buna ait denemeler. **[Possibilities of afforesting burned areas in the Alaçam forest area near Dursunbey in Western Anatolia, and experiments to this end.]** *Istanbul Üniv. Orm. Fak. Derg.* 3*A* (1/2), 1953 (54–98 + 1 tbl + 1 map + 18 plates). 57 refs. [Turk.g.f.]

In 1945 ca. 12,600 ha. of best-quality forest were destroyed by a single fire in the Alaçam forest area near Dursunbey, and in 1949–50 a comprehensive lay-out of trial plots was established there for sowing and planting different species. General conclusions to date (which are detailed) stress the importance of mixed forest in which *Pinus nigra* var. *caramanica* constitutes the most valuable species. This is the only species that can be regenerated naturally on ca. 5% of the area, the shelterwood system, with a regeneration period of 10–12 years, being highly suitable. Strip fellings may also be made, the strips being 10–15 m. wide and proceeding from N. to S. It is advisable to remove the ground cover in places, and to work the soil superficially. In general, planting is more suitable to this region, particularly for the Pines, because of the dry, hot period from July to the end of Sept., the light loamy soil, severe frosts, high bird population and danger of grass competition or the formation of a hard soil crust. Where such conditions are less intense Oak, Beech and Cedar (*C. libani*) may be established by direct sowing. A table gives the best methods and times for this. Broadcast sowings must be made on contourwise strips 1·5–2 m. wide and 8–10 m. long with intervening strips 1–1·5 m. wide on which the ground cover must be left intact. Spot sowings should be made on patches 50 cm. in diam. situated in a triangular pattern, at most 1m. apart. The soil should be worked to a depth of ca. 10–15 cm. according to local conditions. Seed of *P. nigra* var. *caramanica* and of Oaks must be of local provenance, and, for other species, must come from neighbouring areas with similar site conditions. Provisional nurseries must be established in at least 20 different places in order to provide 1 + 0 or 1 + 1 Pine, Cedar and Robinia plants, 2 + 2 or 2 + 3 Fir, and 1 + 0 or 1 + 1 Beech plants, or light-adapted Beech wildings. A table gives planting recommendations for each species. *From author's summary.*

3542. KARSCHON, R. **The Hammada in Wadi Araba: its properties and possibilities of afforestation.** *Ilanoth* No. 2, 1953 (17–45). 18 refs. [E.]

The hammada is a highly saline soil, on which vegetation is entirely confined to the shallow depressions and small runnels whence most of the salt has been leached. Tree-planting is possible only along such depressions.

3543. **[Water requirements of two species of Acacia in desert soils.]** *Rep. Israel Dep. For. 1952/53*, 1953 (3).

A study of tree growth in relation to the amount of soluble salt and moisture in the shallow wadis crossing the plains of *hammada* soil in the Negev has been completed. The soil in the wadis differs from the sterile *hammada* in that the amount of soluble salt is insignificant, the moisture content is higher, and the suction force is much smaller. As a result the roots of the two *Acacia* species (*A. raddiana* and *A. spirocarpa*) do not go beyond the perimeter of the wadis. If any planting is to be done in the desert, these wadis are the most suitable sites.

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also Nos. 3552, 3557, 3570, 3578.

3544. **[Inter- and underplanting Red Cedar (*Cedrela toona*) in Queensland rain forest.]** *Rep. Div. For. Qd. 1952/53*, [1953?] (7).

A start was made on experimental interplanting of *Cedrela toona* in openings made in the rain forest by logging operations, together with the destruction of undesired species and stems. Twig-borer damage is still the main problem with *C. toona* and underplanting is the most promising method of control. Extensive trial underplantings were made in rain forests and considerable success achieved in the use of stumps prepared from wildings by pruning both root and shoot to ca. 8 in. Propagation by cuttings from old trees have also given promising results.

3545. LOGAN, K. T., and FARRAR, J. L. **An attempt to grow White Pine [*Pinus strobus*] under an Aspen [*Populus tremuloides*] stand.** *Silv. Leafl. For. Br. Can.* No. 77, 1953. pp. 3.

Re-examination in 1950 of an experimental planting of White Pine under Aspen, made in 1936, showed that it had been unsuccessful, owing to competition for light and rooting space. There were indications, however, that the shade from the Aspen was beneficial in discouraging weevil attack on the Pine.

3546. **A new legume bush cover plant *Flemingia congesta* (*F. macrophylla*).** *Planters' Bulletin of the Rubber Research Institute of Malaya, Kuala Lumpur* (*n.s.*) No. 5, 1953 (39–41). L.S.

This bushy indigenous legume may attain a height of 10 ft., stands cutting well, and has a deep rooting habit. It grows vigorously in the open and will compete with *Imperata cylindrica* but does not appear able to suppress it. It successfully combats such creepers as *Mikania* and *Passiflora*.

3547. BANTI, G. Osservazioni sul bosso. **[Observations on Box.]** *Monti e Boschi* 5 (5), 1954 (225–8). [It.f.e.]

Describes the associations characterized by the presence of *Buxus sempervirens* in the Apennines, and the value of this species as an understorey plant on account of its deep ramifying root system, which is a potent defence against soil erosion.

3548. KÜNANZ, H. Vom Mischwalde. **[Mixed forest.]** *Allg. Forst- u. Jagdztg.* 124 (6), 1953 (157–68). [G.]

A general account of the history and present state of mixed plantations—mostly of broadleaved species—formed by A. Hemmann between 1925 and 1933 as part of a large-scale programme of coppice conversion in the Zell a.d. Mosel forest range.

3549. AHMAD, K. J. **A study in the possibility of introducing likely valuable species in the open deciduous forest of East Pakistan.** *Agriculture Pakistan, Karachi* 4 (1), 1953 (40–7). O.R.E.

A report on experiments made on the western slopes of the Ramgrah Sitakund range in Chittagong in the enrichment of dry deciduous forest with *Bambusa polymorpha* (begun in 1936) and with *Eugenia grandis, E. jambolana, Anogeissus acuminata, Markhamia platycalyx* and *Xylia dolabriformis* (begun in 1940). Best success was obtained with *X. dolabriformis, E. grandis* and *B. polymorpha.*

3550. Aubréville, A. Premiers résultats des plantations d'Okoumé au Gabon. **[First results of plantations of *Aucoumea klaineana* in Gabon.]** *Bois For. Trop.* No. 35, 1954 (5–9). [F.f.e.span.]

Gives data from enumerations in plantations aged 3, 6, and 7 years, formed for the purpose of enriching existing stands. The general results are very promising. [Cf. *For. Abstr.* 10 (No. 191).]

3551. Fourchy, P., and Lemps, F. de. Un exemple de mise en valeur des taillis de chêne pubescent au moyen du cèdre: La Trouhaude (Côte-d'Or). **[An example of the enrichment of Oak [*Quercus pubescens*] coppice by Cedar [*Cedrus atlantica*] at La Trouhaude, Côte d'Or.]** *Rev. for. franç.* 6 (3), 1954 (151–9 + 3 photos). 6 refs. [F.]

The Cedar was planted in 1848 and at 100 years of age its basal area was 19·54 sq. m./ha., volume/ha. 182 cu. m., girth of mean tree 0·95 m., height 20 m., and c.a.i. 2·78 cu.m./ha. The trees were vigorous and well formed, and there was ample regeneration in clearings.

236. *Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)*

See Nos. 3422, 3703, 3768.

237. *Amelioration of Forest Sites*

See also Nos. 3187, 3729.

3552. Burger, H. Bodenverbesserungsversuche, III. Mitteilung. **[Experiments on soil improvement. III.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 28, 1952 (11–87). 40 refs. [G.g.f.]

Gives the results of the 1933–35 trials [cf. *For. Abstr.* 9 (No. 71)] in 6 localities at 490–970 m. altitude, on degraded sites, originally Oak/Hornbeam and Beech/Fir/Spruce, subsequently under field crops and now under ca. 60-year Spruce with some Pine. About half of the 66 plots were split for underplanting with Beech or Silver Fir under the following treatments, separate or in combination:—(*a*) control, (*b*) superficial hoeing of the moss and mor, (*c*) as (*b*) but down to 5 cm. of mineral soil, (*d*) complete removal of the moss and mor and loosening of the top 5 cm. of mineral soil, (*e*) moss and mor removed in strips of 1–2 m. on to intervening strips of equal width, (*f*) light mulching with slash, (*g*) application of [moss and mor] ash, 150 g./sq. m., (*h*) CaO or $CaCO_3$ at 500–700 g./sq. m., (*j*) inoculation (sprinkling) with good forest soil, 1 litre sq. m. *Effects on soil*: On controls after 15–20 years no change in infiltration rate was shown but all soil manipulations, particularly (*d*), strongly reduced the permeability at the surface especially in the first 5–7 years, this effect diminishing as the moss layer re-established itself. No lasting effect on permeability was produced by (*f*). Underplanting, particularly as the lower canopy closes, clearly assists penetration of rainfall. Acidity also, within the limits of measurement, has not altered on controls but the dry seasons of the 1940s have tended to neutralize less acid soils where moss and mor were removed. The action of (*g*) was perceptible up to the end of the first season only in the upper 5 cm. in treatment (*d*), and was never in evidence there lower than 15 cm. or for more than 4 years. Soil manipulations (*b*) to (*d*) plus liming (*h*) kept the $pH > 5$ for 15–20 years down to 50 cm. This dosage of lime is completely absorbed by the moss and mor layers where soil is not worked. *Effects on ground flora*: In spite of repeated thinnings the controls show no change. Treatments (*d*) or (*e*) even with (*g*), but without liming, have encouraged little invasion. Soil working without liming always resulted in the re-establishment of an even less favourable moss layer. Working and liming was followed by an appreciable invasion, but with inoculation (*j*) a much richer humus-consuming flora resulted, and this, in more favourable sites, spread to the untreated areas. Under (*d*) above the *status quo* may be re-established in as little as 15 years. *Effects of underplanting*: Damage by roedeer made the assessment of results difficult. Beech on acid soils reacted rather favourably but not significantly to liming. Height increment was similar in worked and unworked soils though general growth was better in the former. Beech litter decomposed very slowly in all plots. Silver Fir growth was unaffected by liming; better growth was obtained in (*c*) than in (*e*), with the worst in (*d*), an astonishing result of practical importance as this species certainly prefers the brown earths to acid soils. Underplanting with Beech or Fir has in no case produced any discernible effect on soil acidity. The Spruce stands, under thinning every 2–3 years, have so improved that their immediate liquidation, formerly proposed, cannot be accepted; the ameliorating effects of underplanting well warrant its cost, even though only a proportion of the Beech and Fir will reach exploitation age. *From author's summary.*

3553. Schneider, B. Erfahrungen mit Kalk- und Gründüngungen auf podsolierten Waldböden. **[Experience with liming and green manuring on podzolized forest soils.]** *Forstarchiv* 23 (8), 1952 (153–8). 9 refs. [G.g.]

In liming trials [at Burgsteinfurth?] in N.W. Germany, overliming with CaO before sowing caused severe growth disturbances and mass dying in sowings of Scots Pine. Good results have been achieved with 80% CaO applied at a rate of 2500–3000 kg./ha. for the activation of raw humus under old Pine and on clear fellings, and 1500–2000 kg./ha. for strip sowings or plantings of Pine. Norway Spruce and Larch will tolerate twice these quantities. For activating deep Beech raw humus at least 6000 kg./ha. are needed. Some figures are included from experiments to show the increase of the bacterial and the decrease of the fungal population in samples of Beech and Scots Pine + Beech raw humus after liming, under laboratory conditions. In trials with perennial lupin (*Lupinus polyphyllus*) plus liming, too high an admixture of lupin resulted in abnormal rooting habit (often the failure of taproot development) and poor stem form in some Pine plantations, attributed to excess of N in the litter. The author is now trying 1-m. squares sown with lupin, at 4-m. triangular spacing with Pine in the interspaces, and also 4- to 6-m. squares with a 40-cm. border of sown lupin, the interior of the square being planted with Pine.

3554. LOHWASSER, W. Kalkdüngungsversuche im Eggegebirge und Hunsrück: ertragskundliche Untersuchungen. **[Liming experiments in the Eggegebirge and Hunsrück: increment studies.]** *Forstarchiv* 24 (9/10), 1953 (213–22). 18 refs. [G.g.]

Summarizes the results of a number of liming experiments, dating from 1927 onwards, on moderately to slightly podzolized, base-deficient brown earths in these two regions, where thick raw-humus layers had formed after two generations [or more?] of pure Norway Spruce, discussing the effects of liming on the soil, ground vegetation, regeneration, and increment as shown by a study made in 1950. Conclusions are as follows: (1) Liming has transformed densely compacted raw humus into a black, loose and more amorphous mass, the change proceeding quicker with larger dosages and where the lime was intimately mixed in with the humus. The CaO requirement for proper decomposition is 500–800 kg./ha. per cm. depth of humus layer. Liming considerably raised the pH of the humus and bleached horizons; at 600 kg. CaO/ha. it had also raised the pH of the B horizon after 20 years. It did not affect the depth of the humus, but reduced its sp. gr. (2) The ground flora became richer in species, nitrophilous species being characteristic invaders, but the full effect depended on some opening of the canopy; limed plots also showed an increase of fungus sporophores and changes in the fungus flora. (3) After liming, natural regeneration of Spruce is possible once more. It is noted, however, that in spite of improved nutrition and vigour, the seedlings root mainly in the decomposed humus and may suffer in severe drought if canopy is removed too quickly. Planted Spruce on limed plots did not go into check, closed canopy earlier and grew more uniformly than controls, but increased root competition will retard height growth after closure unless the spacing is wide enough and tending begins early. (4) In one trial, various fertilizers were applied at planting time to Spruce on (*a*) unlimed plots, and (*b*) plots limed 1–3 years previously. On (*a*) 'Nitrophoska' [rate unspecified] checked growth, but on (*b*) growth was better than that of controls. Best growth was noted for (*b*) with 10 g. $(NH_4)_2SO_4$ (+ 50 g. basic slag and 37·5 g. 40% KCl) per planting hole. (5) For Spruce and Beech the added increment due to liming averaged 1·6 cu. m./ha./year; of the 13 stands examined, 8 showed an extra 1–4 cu. m. and 3 up to 1 cu. m., while the remaining two showed zero or negative effects. The increase in stand increment was greatest where density was reduced by thinning to 0·6–0·7 of full yield-table stocking, and it should be borne in mind that the increased foliage production after liming means earlier closure of canopy. (6) The rates of liming tried varied from 2000 to 10,000 kg. CaO/ha. (as quicklime, 80–95%, or as various 'industrial' limes, ca. 45% CaO). In general, 4,000–10,000 kg. CaO/ha. should suffice. There was no difference in effect, however, between equal weights/ha. of quicklime and 'industrial' limes, probably because the latter contain small amounts of other nutrients (e.g. N, P_2O_5 or trace elements), so that direct comparison of effects is difficult. (7) In the Hunsrück, liming makes it possible to grow Beech directly after several generations of Spruce, and in mixtures the Beech will suppress the Spruce unless the latter is grown in groups. Improved nutrition renders the Beech more shadebearing; natural pruning is slower, branching coarser, and wolf trees more frequent on the limed plots. (8) The effect of liming on increment shows no marked lapse even after 20 years. Even if the benefit to the soil is left out of account, costs (DM 150–250/ha.) are small in proportion to the effect, and should be covered by the added increment of the first 3–4 years. It should be advantageous to lime old stands 5–10 years before re-planting, so as to reap the benefit of extra increment both on the old crop and on the new. (9) On many sites, liming should enable pure crops of conifers to be retained without fear of further soil degradation.

3555. WITTMANN, R. Arbeitstechnische Methoden der Forstkalkung. **[Methods of liming in the forest.]** *Forst- und Holzw. 9A* (7), 1954 (142–4). [G.]

Describes and illustrates various types of German equipment of proved use.

3556. THURMANN-MOE, P. Aktuelle problemer i skogggrøftingen. **[Present problems in forest drainage.]** *Tidsskr. Skogbr.* 62 (2), 1954 (53–62). [Nor.]

Gives a graph showing the relationship between low timber prices and increased drainage operations in Norway from 1910 to 1940, and discusses the improvements and increased use of blasting for making drains since the war, the area suitable for drainage, and already drained, and some examples of tree growth on drained areas and the effect of thinning and the use of fertilizers.

238. *Timber Plantation Crops requiring Special Treatment*

See Nos. 3319–22, 3435, 3445–6, 3534–6, 3565, 4428, 4432–3.

24. TENDING OF STANDS AND TREES

See also No. 3900.

3557. SAATÇIOĞLU, F. Orman bakımı: meşcere yetiştirmesine ait tedbirler. **[The tending of forests: measures for the care of stands.]** *Istanbul Üniv. Yay.* No. 580 (*Orm. Fak.* No. 25). 1954. pp. viii + 311. 121 refs. [Turk.]

A textbook based on Turkish conditions and including the results of numerous experiments carried out there. There are separate sections for high forest at all stages, coppice, coppice with standards, individual trees and introduction of understoreys.

241. *Cleanings*

See No. 3820.

242. *Thinnings*

See also Nos. 3556, 3728, 3760, 3825.

3558. Ilvessalo, Y. **Performance of thinning experiments in Finland.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 23 (No. 6), 1953. pp. 4. 8 refs. [E.] Limited distribution.

3559. Becking, J. H. Einige Gesichtspunkte für die Durchführung von vergleichenden Durchforstungsversuchen in gleichaltrigen Beständen. **[Some aspects of the execution of comparative thinning experiments in even-aged stands.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 23 (No. 3), 1953. pp. 2. [G.] Limited distribution.

Includes preliminary conclusions from research in Holland that normal thinning there is too light, that an optimum thinning grade exists for each species (e.g. Douglas Fir 22%, Poplar 37%), and that for some species (e.g. Douglas and Poplar) this optimum grade is fairly constant, while for others (e.g. Larch, Oak) it increases with age.

3560. Hummel, F. C. **The definition of thinning treatments.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 23 (No. 4), 1953. pp. 6. 12 refs. [E.] Limited distribution.

A stand-density index is suggested based on the average spacing between trees expressed as % of top height, assuming square spacing and taking top height as the height corresponding to the mean b.a. of the 250 largest trees /ha. The spacing equivalent to 20% of top height (corresponding to spacing in plots thinned to a C/D grade) is suggested as "standard spacing", 1·0, with 0·5 corresponding to E grade, 0·75 to D, 1·5 to C, 2·5 to B and 4·0 to A. Tabulated figures show the number of stems/ha. for different heights and for the various indices of stocking. Intervals between successive thinnings could be specified either by prescribing the index of stocking to which a stand is allowed to "thicken up" before being thinned again or by specifying the interval in terms of height growth. The latter is thought preferable and a 2-m. height interval would be suitable as a standard, allowing for slight variations so that the number of growing seasons between one thinning and the next may be a whole number. Tabulated figures of the % of stems removed show a progressive decrease from 30·6% at a top height of 12 m. to 12·9% at 30 m.

3561. Macdonald, J. A. B. **Crown thinning in practice.** *Scot. For.* 8 (2), 1954 (85–9).

Arguments are given in favour of a specially heavy type of crown thinning, in which the object is to provide optimum advantage to not more than 100 trees/acre and take any opportunities that the system provides to develop irregularity. Ordinary grades, including light crown thinning, all eventually result in very uniform stands.

3562. Bauer, F. Der Einfluss frühzeitiger und starker Durchforstungseingriffe auf Wachstumsgang und Leistung der Waldbestände. **[The effect of early heavy thinnings on the development and yield of stands.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 2), 1953. pp. 8. [G.] Limited distribution.

Discusses the development of modern thinning practices, and quotes figures from permanent experimental areas of Fir in S. Baden showing the favourable effects of thinning on timber yield and quality.

3563. Day, M. W. **Results of thinning a Spruce/Fir stand.** *Quart. Bull. Mich. agric. Exp. Sta.* 36 (3), 1954 (270–4).

A series of $\frac{1}{5}$-acre thinning plots were established in 1940 in mixed White and Black Spruce and Balsam Fir. The results after 10 years are discussed but cannot be analysed statistically owing to lack of replication.

3564. Møller, C. M., and Nielsen, J.; Løvengreen, J. A. Udhugning og tilvækst i eg på Bregentved. **[Thinning and increment of Oak in Bregentved.]** *Dansk Skovforen. Tidsskr.* 37 (3; 5; 6), 1952 (108–17; 234–50; 329–30). [Dan.]

Rejects certain conclusions in Løvengreen's paper [see *For. Abstr.* 13 (No. 4101)] as regards the effect of thinnings upon increment in the Bregentved Oak woods, arguing that they were based on too few sample trees and inappropriate methods of calculation, and giving the authors' own interpretation of the figures concerned. Løvengreen replies in some detail and the first authors append a final note.

3565. Becking, J. H. Omloopstijd en dunning van wijd geplante populieren culturen in Nederland. **[Rotation and thinning of widely spaced Poplar plantations in the Netherlands.]** *Ned. Boschb.-Tijdschr.* 26 (3), 1954 (57–65). 4 refs. [Du.g.]

It is generally considered in the Netherlands that a rotation of 25 years is best for Poplar and that in single-clone plantations thinning is unnecessary. A study of measurements in stands of *P. marilandica* suggested that the financial rotation had not been reached at 38 years and that thinning gave good results. Further research is needed.

3566. Landon, F. H. **Meranti Tembaga thinning plots.** *Malay. Forester* 17 (1), 1954 (15–8).

Notes on an experiment in thinning young natural regeneration of *Shorea leprosula*. The plots were destroyed during the Japanese occupation. The preliminary results indicated that thinning would not be economically justifiable.

3567. ***Eucalyptus pilularis* thinning experiments.** *Rep. Dir. For. Qd. 1952/53*, [1953?] (10).

Analysis of data from three 29-year-old thinning experiments showed that over the period 1942–52 maximum volume increment was on spacings from 13 × 13 ft. to 16 × 16 ft. Over the last 2 years of the period, the 20 × 20 ft. plots put on volume increment close to the maximum and it appears that the b.a. carried on these plots is near to optimum for this species on this site [in S. Queensland].

3568. Parente, E. I tagli intercalari nei boschi cedui. **[Intermediate fellings in coppice stands.]** *Monti e Boschi* 5 (6), 1954 (262–6). [It.f.e.]

Discusses the desirability of thinning coppice stands, and suggests that the cost of the operation may be repaid by the resulting increase in yield and quality of final products.

3569. Berntsen, C. M. **Report on tested methods of commercial thinning on steep ground.** *Timberman* 55 (8), 1954 (94–7).

Logging damage was kept low in dense 100-year-old mixed conifers on steep slopes running downhill from a logging road by cutting trees into 18-ft. lengths and yarding straight uphill with a winch and boom mounted on a half-tracked tractor. Little mineral soil was exposed. Details of costs, time and timber removed are given.

243. *Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)*

See also Nos. 3423–4, 3587, 3702.

3570. Huckenpahler, B. J. **Poisoning versus girdling to release underplanted Pines in North Mississippi.** *J. For.* 52 (4), 1954 (266–8).

Undesirable overstorey hardwoods, principally Blackjack, Post, Red, and Black Oaks and Hickories were treated by frill girdling and by the Ammate-in-notch system of poisoning to release 8-year-old underplanted Loblolly Pine. The principal findings were: (1) Single-hack frill girdling gave a more complete crown kill on upland Oaks and Hickories and cost less, but was slower in killing than Ammate poisoning. (2) Ammate poisoning was more effective in preventing sprouting than was frill girdling or felling without application of Ammate. (3) With or without application of Ammate, small trees sprouted much more prolifically than large trees. (4) During the two years following treatment, released Pines outgrew those not released. Differences in the average growth of all Pines between poisoned and frill-girdled plots were not statistically significant. (5) Almost one-tenth of the underplanted Pines were killed or severely damaged by falling stems or branches of dead trees. This heavy damage is believed to be largely due to the 8-year delay in release. *From author's summary.*

245. *Tending of Trees, Pruning etc.*

See also No. 3641.

3571. Wave, H. E., Wentworth, D. F., and Chapman, G. L. **A pruning time study for Spruce and White Pine in uneven-aged, natural stands.** *Tech. Note Univ. Me. For. Dep.* No. 15, 1952. pp. 2.

The study indicates that trees suitable for and in need of pruning can be found in uneven-aged stands in the Spruce/Fir type and that the time spent in finding and pruning these trees compares favourably with pruning time usually required for plantation-grown trees.

3572. Bennett, F. A. **A practical schedule for pruning planted Slash Pine.** *Res. Note Stheast. For. Exp. Sta.* No. 53, 1954. pp. 2.

The following recommendations are made for 2-stage pruning: (1) At 5–6 years, prune to 8 ft., removing not more than 35% of the live crown and maintaining a crown/total-height ratio of ca. 50%; (2) After a further 5–6 years prune to 17 ft., still maintaining the 50% ratio.

3573. Labyak, L. F., and Schumacher, F. X. **The contribution of its branches to the main-stem growth of Loblolly Pine.** *J. For.* 52 (5), 1954 (333–7).

Open-grown, 15-year-old *P. taeda* was pruned to leave live-crown ratios of 10, 20 . . . 90%, and again 5 and 10 years later to maintain initial ratios. After 15 years, 10 stems of each crown ratio were analysed, each in 10 equal lengths, and the location (D) of the branches (in % of total height from the top), their length (L) and the number of branchlets (N) were noted. The sectional-area increment of the last 5 years at any section P is expressed in terms of D, L and N in a basic equation, the co-efficients of which are supplied by the method of least squares from the field data, illustrated in tables and graphs. Conclusions are that: (1) pruning has no effect on cross-sectional growth that is not explained by D, L and N; (2) except for the root swelling, maximum growth is at the crown base; (3) the average contribution of a single branch depends on D and N. In the top $\frac{1}{10}$ of the tree a branch contributes most of the stem growth just below D, but lower branches' contributions are fairly evenly spread downwards; (4) branches with $N = 3$ in the lower half or $N = 5$ in the lowest quarter contribute nothing to the bole; (5) each part of the crown is characterized by branches of given L and N. For bole increment the most efficient branch is a typical one at $D = 15\%$ from the top; (6) a live crown ratio of 0·4 produces maximum clear volume, while one of 0·3 produces 89% of this.

3574. Hosoi, M., and Yamamoto, K. **[Reduction in radial growth of *Pinus densiflora* after heavy pruning.]** *J. Jap. For. Soc.* 36 (2), 1954 (42–4). 1 ref. [Jap.e.]

The distribution of radial increment in 5 trees for 3 years after heavy pruning is shown in a diagram with English legends. The reduction in ring breadth was very marked the first year after pruning but a steady recovery occurred in the following years. *From authors' summary.*

3575. Takahara, S. **[Influence of pruning on the growth of Sugi (*Cryptomeria japonica*) and Hinoki (*Chamaecyparis obtusa*).]** *Bull. Tokyo Univ. For.* No. 46, 1954 (1–95). 100 refs. [Jap.e.]

Pruning experiments in stands showed that dry pruning and moderate green pruning had no great or lasting effect on increment, but that heavy pruning ($\frac{2}{3}$–$\frac{3}{4}$ of tree height) retarded increment for 3–5 years on good sites and for longer periods on poor sites. Form factor was in no case affected. Studies of the effect on increment of the amount of foliage in the sun and shade crowns are discussed in detail and related to the pruning results. It is concluded that heavy pruning should only be carried out on the best sites. [Results are shown in graphs and tables with English legends and there is a full English summary.] *From author's summary.*

3576. Nägeli, W. Aufastungsversuche in gleichaltrigen Nadelholzbeständen des schweizerischen Mittellandes. **[Pruning research in even-aged softwood stands on the Swiss Plateau.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 28, 1952 (271–354). 75 refs. [G.g.f.]

Treatments of Spruce and Silver Fir since 1929 have included the cutting, flush with stem, of (*a*) all dry branches except those of the 2 uppermost whorls, (*b*) all dry branches, plus the lowest whorl carrying any foliage and the next whorl above it (light green pruning), (*c*) as in (*b*) plus 4 whorls of the green crown (heavy green pruning), and (*d*) unpruned control. A knot-free layer 10–12 cm. thick is probably the minimum requirement and that in stems of good quality on sites of qualities at least I/III. The maximum d.b.h. at first pruning is 15 cm. (20-, 25- or 30-year Spruce on site qualities I, II or III respectively). As $\frac{2}{3}$ of the co-dominants and only $\frac{1}{10}$ of the dominants have disappeared in 10 years, pruning should be concentrated on the latter. Pruning from the ground should be done on 1000 choice stems per ha., these being reduced later to 650–750. Pruning height in the first pruning with treatment (*a*) was to 3–3·3 m. and for (*b*) 4·9–5·9 m. To restrict the knotty core to 15 cm. diam. in the upper parts of the pruned length, prunings must be repeated at 5-year intervals and continue to a height of from 4·5 to (preferably) 9 m.; at least 3 dry prunings are required in 10–15 years. Treatment (*b*) gives an advantage of 2 years and in particularly favourable conditions may reduce prunings to two. This pruning of 2 or at most 3 green whorls from the shade crown is justified and causes no increment loss. Examination of many hundreds of samples of both dry and green pruning scars revealed no single instance of decay. With timely pruning, branches of 3 cm. diam. and over are only exceptionally met. The promotion of a stem (e.g. from dominated to dominant) due to pruning was not seen in these trials though dry pruning increased the light at ground level by 30–60% and green pruning by twice as much. *From author's summary.*

3577. Chapman, G. L., and Taylor, R. F. **Nine years of bud pruning in a Red Pine plantation.** *Tech. Note Univ. Me. For. Dep.* No. 10, 1951. pp. 2. 3 refs.

A further report on an experiment begun in 1941 on 5-year-old trees [cf. *For. Abstr.* 8 (No. 1073)]. By the end of 9 years, pruned trees were not significantly shorter than unpruned, but current growth was slowing up. It is considered that on good sites it should be practicable to prune for 10 years and so obtain a clear 16-ft. log. [Cf. *For. Abstr.* 14 (No. 3386).]

25. TREATMENT OF DEFECTIVE, DERELICT OR VERY OPEN STANDS

3578. Graniczny, S. Badania nad dolesianiem powierzchni pod drzewostanami lukowatymi i nadmiernie przerezedzonymi. **[Investigations on the restocking of stand gaps and excessively thin stands.]** *Prace Inst. Bad. Leśn.* No. 86, 1952. pp. 100 + 5 tbls. 55 refs. [Pol.russ.]

Regeneration by planting was investigated for *Pinus sylvestris*, *Quercus robur*, *Q. rubra*, *Abies alba*, *Pseudotsuga taxifolia*, *Populus* sp., and regeneration by sowing for *Fagus sylvatica*, all in triangular openings of 900 sq. m., with one apex pointing S; sowings and plantings were also made under canopies of different density in specially prepared experimental plots. It was found that the most unfavourable microclimatic conditions exist in the open; conditions become increasingly favourable in the following order: (1) triangular gaps in young stands, (2) triangular gaps, and circular gaps of 40 m. diam. in Pine pole-forest, and (3) circular gaps of 20 m. diam. in Pine pole-forest. Conditions again worsen as the diam. is further reduced. Microclimatic conditions within the gaps show great variability and differentiation. All species except *Populus* tolerate reductions in insolation; many species perished because of sunshine excess. Provisional recommendations are: (1) in circular gaps an optimum diam. of 30 m. in high forest, 20 m. in pole stands, and 15 m. in young forest; rectangular or oval gaps, with longer E–W dimension, and slightly narrower than the height of the stand, are the best solution; (2) canopy density on quality-3 sites should not exceed 0·4 for regeneration under canopy; (3) sowing should be resorted to only on the best sites; in gaps exceeding the optimum size, any residual stems should be preserved; fast growers (Larch etc.) should be introduced into gaps in young forests; Larch and Birch should not be introduced under a canopy; light-demanding species should be used in large gaps, shade-bearing and shade-demanding ones in small gaps; in large gaps the following distribution should be adhered to: Pine, Birch, Alder, Red Oak to N side; Oak (*Q. robur*) to E and W; and Fir, Beech, Hornbeam and Oak to S, the centre being reserved for Larch. [Cf. *For. Abstr.* 13 (No. 2998).]

26. COMBINATIONS OF FORESTRY WITH AGRICULTURE AND PASTORAL HUSBANDRY (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

3579. McMahon, C. G. **Tree planting on the southern tablelands [of New South Wales].** *J. Soil Conserv. Serv. N.S.W.* 10 (2), 1954 (77–84).

Notes on choice and propagation of species for shelterbelts, stream-bank stabilization, and shelter for stock in paddocks.

261. *Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land*

See Nos. 3201, 3210.

3580. Chaturvedi, M. D., and Uppal, B. N. **A study in shifting cultivation of Assam.** *Research Series, Indian Council of Agricultural Research, New Delhi* No. 2, 1953. pp. 20 + map.

262. *Fuel and Fodder Forests*

See Nos. 3589, 3908.

264. *Farm Forests*

3581. Preston, J. F. **Developing farm woodlands.** McGraw-Hill Book Co., Inc., New York.

1954. pp. xi + 386. 130 refs. Price $4.50 [£1. 16*s*. 0*d*].

A simple, copiously illustrated, handbook for farmers on the management of their woodlands.

265. *Strips or Lines at Road, Rail and Canal Sides etc.: Hedgerow Trees*

See Nos. 3579, 3582.

266. *Shelterbelts, Windbreaks*

See also Nos. 3246, 3293, 3437, 3579, 4407.

3582. Grivaz, F. L'arborisation d'une plaine: la plaine de l'Orbe. **[Tree-planting on the flood plain of the Orbe.]** *Schweiz. Z. Forstw.* 105 (2), 1954 (80–92 + plate). [F.g.]

An account of the shelterbelts and canal-bank planting after the drainage of this wind-swept plain.

3583. Ničota, B. Podignuvanje polezaštitni šumski pojasi vo Ovče Pole. **[Establishment of forest shelterbelts in Ovče Pole.]** *Godišn. šum. nauč. opit. Inst., Skopje* 1, 1951 (115–86 + 1 map). 35 refs. [Maced.maced.e.]

The plateau of Ovče Pole (ca. 1400 sq. km.), surrounded by moderately high hills, has a semi-arid climate. Annual precipitation is 457–510 mm., with a minimum in summer months, when the mean temperature is 23·5° C. Lange's rain factor for the area [annual precipitation/mean annual temperature] is 35. Unfavourable winds blow from NW–N–NE in winter and early spring, reaching a velocity of 12 m./sec. or more, and lasting for several days. The problem of creating shelterbelts in Macedonia has been studied since 1929, but systematic research and establishment began only in 1947. The following lengths (in m.) of shelterbelts were established: spring 1947—4,820; autumn, 1948—6,240; Dec. 1948–Jan. 1949—20,250; autumn, 1949—1,250; autumn, 1950—1,100, and spring, 1951—1,100. The shelterbelts were mainly on *smolnitza* soils [cf. Kubiëna: *The Soils of Europe*, 1953], but some few also on saline, alkali and skeletal soils. It was found that, in arid conditions, cultivation plays an important part, particularly if belts are to be established on pastures or meadows, where 2 years' deep cultivation was found necessary. The young stock used experimentally was reared without watering and with only 4–5 shallow hoeings, in 20-cm.-wide rows (not beds). The following 12 species were used in 1947/48: *Robinia pseudoacacia*, *Populus* "*canadensis*", *Ailanthus altissima*, *Gleditsia triacanthos*, *Ulmus campestris*, *Fraxinus* sp., *Amygdalus communis*, *Elaeagnus angustifolia*, *Sophora japonica*, *Prunus armeniaca*, *Amorpha fruticosa*, *Tamarix parviflora*.

The belts were orientated NE–SW at an angle of 30° to the prevailing wind, with intervals of 200–250 m. between them and 500–2000 m. between the transverse (subsidiary) belts. The first experimental belts were 5·6–16 m. wide (5–11 rows) and occupied 4–7% of the total field area. After 1947, the following composition was adopted: 50–60% long-lived species, 25–20% quick-growing species, and 25–20% shrubs, the belts having different profiles. Four years' experience has shown that *A. altissima* gets killed in the first year, and *P.* "*canadensis*" in the second year, by *Saperda populnea*. The % survival, average height, height increment, and maximum height are tabulated or indicated for each species. Analysis of the effect of cultivation shows that in arid regions it must be done 4–5 times in the first year, 3 in the 2nd, twice in the 3rd, and once in the 4th. Preliminary investigations show that the yield of barley in a sheltered area is somewhat increased.

3584. Nagle, J. P., and Steffen, E. H. **Survival of trees and shrubs in Washington farm windbreaks.** *Sta. Circ. Wash. St. agric. Exp. Sta.* No. 223, 1953. pp. 4.

A brief analysis of the various causes of mortality.

3585. Nagle, J. P., and Steffen, E. H. **Growth rates of trees in farm windbreaks [in Washington].** *Sta. Circ. Wash. St. agric. Exp. Sta.* No. 222, 1953. pp. 3.

268. *Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.*

3586. **Technical meeting on forest grazing.** FAO, Rome. No. *FAO/TMFG*/1–22, 1954.

The final report of the meeting, some of the papers presented, and some notes of the secretariat based on other papers, have been published in mimeo form. Subjects include training for forest-range management, surveys of range resources, forest grazing research, policy, relation of forest grazing to livestock management, re-sowing and improvement of forest range, transhumance and nomadism, grazing on catchment areas, and fire in relation to forest grazing.

3587. Mitchell, A. L. **Timber treatment for grazing on a property in the Glenbawn catchment.** *J. Soil Conserv. Serv. N.S.W.* 10 (2), 1954 (70–6).

A study was made of an area of grazed second-growth Eucalypt forest, part of which was treated 7 years ago by girdling all trees except a few left for shelter and shade. It was found that soil compaction and erosion were general in the untreated parts and there was very scanty ground cover. Treated areas had a good cover of permanent grass. Sowing of desirable grasses and broadcasting of fertilizers at the same time as girdling operations, are recommended.

3588. Hilli, A. **[Prevention of epizootic haemoglobinuria in cattle by eradicating Alders in the pastures.]** *Karjatalous, Helsinki* 26, 1950 (324–7). [Fi.?] From *abstr.* in *Chem. Zbl.* 124 (38), 1953 (6119). [G.] L.S.

The blood parasites (*Babesia bovis*) which cause haemoglobinuria have as carriers ticks that live mostly on Alders. It is recommended to destroy Alder shrubs on pastures by using growth regulators.

27. ARBORETA. ARBORICULTURE FOR ORNAMENTAL PURPOSES. HEDGES AND HEDGE PLANTS

See also Nos. 3275–81, 3299.

3589. Harrison, S. G. **Ornamental trees and shrubs as a potential source of fodder in the British Isles.** *Quart. J. For.* 48 (2), 1954 (109–21). 39 refs.

Gives a list of ornamental trees and shrubs hardy in parts of the British Isles and known to be eaten by livestock. The use of these species for ornamental planting is advocated.

3590. Haskell, T.; Turner, H. E. **Practical blossom control for the arborist.** *Proc. 29th nat. Shade Tree Conf. 1953*, 1954 (4–20).

Two papers describing experimental spraying (1) of the commoner American street trees with a number of chemicals in order to prevent the blossom from setting, (2) of the ♀ Ginkgo with water under pressure in order to remove the unripe fruit before it develops its noisome smell.

28. HUSBANDRY OF FOREST PRODUCTS OTHER THAN WOOD

See also section 892.

283. *Fruit and Seed Crops*

See also Nos. 3169, 3306.

3591. Vaissière, J. de. La châtaigneraie. **[Chestnut growing in France.]** *Bull. Soc. for. Franche-Comté* 27 (2), 1954 (52–8). [F.]

Discusses the decline of chestnut growing in France due to changes in diet, farming methods, disease, and other causes.

284. *Crops Tapped for Exudations*

See also No. 3434.

3592. Snow, A. G., Jr. **Progress in development of efficient turpentining methods.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 32, 1954. pp. 35. 38 refs.

Summarizes results of studies over 5 years on yields obtained from Slash and Longleaf Pines for varying methods of tapping with chemical stimulation, and the effect of frequency of treatment, size of face, acid concentration and use of fertilizers, etc.

3593. Schopmeyer, C. S. **Labor requirements for working turpentine faces.** *Naval Stores Rev.* 64 (1), 1954 (17–8).

Estimated man-hours for working 1000 faces in one season, with ca. 25 faces/acre, are reduced by $\frac{1}{3}$ with modern methods of bark freshening and acid treatment.

3594. Dudić, M. Ogledno smolarenje na području šumske uprave Višegrad. **[Experimental resin tapping in the area of the Višegrad forest district.]** *Šumarstvo* 7 (1), 1954 (26–37). 6 refs. [Serb.g.f.]

Presents the results of investigations made in 1938 (from April 20 to Oct. 30) on the tapping of *Pinus nigra* on 4 experimental plots in Bosnia and Herzegovina. The French system was used, with a 3-day tapping cycle, on 500–600 stems carrying ca. 1000 faces at each site. All 4 plots carried pure *P. nigra* on skeletal soils, but plot 3 had an understorey of 10- to 20-year-old *Quercus sessiliflora*. Other data and yield are as follows:—

Plot	*Altitude (m.)*	*Stand density*	*Resin yield g./sq. cm. of face*
1	700–930	0·5	1·30
2	920–975	0·6	1·45
3	480–536	0·8	1·47
4	500–800	0·6	1·77

The stands averaged 40·9 cm. d. [b.h.?] and 23·6 m. high. Chemical analysis of the crude resin showed: moisture 5·90%; impurities 1·74%; turpentine 19·88%; rosin 72·66%.

3595. Kalninjš, A. I. Opyty s himičeskim vozdeĭstviem pri podsočke sosny i eli v Latviĭskoĭ SSR. **[Experiments with chemical stimulation in Pine and Spruce tapping in Latvia.]** *Trud. Inst. lesohoz. Probl.* No. 6, 1953 (19–28). 32 refs. [Russ.]

Reviews work done in Latvia since 1923 on chemical stimulation of resin flow. According to Rasinj's researches of 1945–50 (reference not given), chemical stimulants (acids and alkalis) act only on the cambial layer. The higher the concentration of the stimulating agent, the longer should be the intervals between freshenings. Resin yields of Pine are graphed month by month for the period May 23–Oct. 3, 1952 for many different stimulants, (KH_2PO_4, H_3PO_4, Na_3PO_4, NaH_2PO_4, H_2SO_4, $SnCl_2$, $ZnCl_2$, NH_4CNS, $Na_2S_2O_4$, NaOH, KOH, KClO, chlorinated lime, and glucose). Chlorinated lime in the form of paste was found to be highly efficient; phosphates and sugars seem to be promising. Rasinj found that, with Spruce, the highest yield per shift was obtained with a freshening interval of 13–20 days, with freshening beginning late in May, and the best system proved to be the usual herring-bone face with streaks at 5 cm. intervals and a 7-day freshening cycle. The best stimulants were KOH (15%), H_2SO_4 (50%) and HCl (25%); they increased yield by 30–35%. Deepening the streaks did not increase the yield.

3596. Stanescu, M., and Petrescu, L. Influenţa rezinajului asupra creşterilor la molid şi pin. **[The influence of resin tapping on the increment of Spruce and Pine.]** *Rev. Pădurilor* 68 (6), 1953 (21–5). 7 refs. [Rum.rum.russ.]

Analyses the effect of tapping as a function of its duration and intensity; the value of the resin; and the age and quality class of the trees. Tabulated data are given of measurements made on two Spruce stands, aged 62 and 45 years respectively, which indicate that resin tapping at first accelerates c.a.i. in middle-aged trees, and then depresses it.

285. *Leaf Crops*

See also No. 4385.

3597. Bryant, L. H., Crumpton, J., and Davis, G. R. **Project C4. Sub-project C4-5. The effect of cutting frequency and cutting height on leaf yield and oil quality in a natural stand of *E[ucalyptus] dives* type. Working plan.** Forestry Commission of New South Wales, Sydney 1953. pp. 6. 3 refs. P.R.

286. *Osier-Growing*

3598. Dămăceanu, C. E. Câteva indicaţii pentru cultura răchiteî. **[Osier growing.]** *Rev. Pădurilor* 68 (4), 1953 (12–7). 7 refs. [Rum.rum.russ.]

Notes on choice of site, soil preparation, choice of species, and methods of planting and harvesting.

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

30. WORK SCIENCE (WORK STUDIES): GENERAL

302. *Man and Work (Physiology and Psychology)*

See also No. 3631.

3599. GLÄSER, H. Zum optimalen Tempo bei körperlicher Arbeit, insbesondere beim Schlagen. **[The optimum tempo in manual work, especially in striking [e.g. with the axe].]** *Forstarchiv* 24 (4/5), 1953 (109–15). 27 refs. [G.g.]

Reviews the present state of knowledge in this subject and puts forward optimum working rates (i.e. those resulting in optimum physiological efficiency) for some individual actions, viz. walking on level ground, sawing with 1- and 2-man saws, striking (e.g. axe work), hoeing, shovelling, and filing. The rates are expressed mostly in strokes or double strokes per minute.

303. *Training in Work Science and Efficiency*

3600. **Vocational training of forestry workers.** [*Publ.*] *FAO/EFC Pilot Comm. Logging Tech.* No. *FAO/EFC/Log* 15 rev. 1, 1954. pp. 56. 36 refs.

Includes some details of training courses in Austria, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, and Switzerland.

304. *Hygiene. Safety. Accidents and their Prevention*

3601. ORDMAN, D. **Allergy and its significance in South Africa.** *S. Afr. J. Sci.* 50 (7), 1954 (177–81). A.P.B.

Includes notes on some S. African tree species causing allergies in man through their pollen or their wood dust.

305. *Sequence of Work and Performance (Time and Performance Tables, Evaluation of Work)*

See Nos. 3449, 3571, 3593.

307. *Tools, Equipment, Machines and Working Animals: General*

See also Nos. 3449, 3460, 3491–5, 3497, 3500, 3505, 3522–3, 3555, 3653, 3787.

3602. **Equipment News.** *Unasylva* 8 (2), 1954 (85–6).

Descriptive notes, with photographs, of the following among others: a machine that makes pots from organic soil and plants young trees in them in one operation at a rate of 1500/hr. with a 2-man team, for the purpose of transport to the planting site (Bruno Krause, Mannheim-Blumenau, Germany); a tree-climbing ladder with single tubular metal stringer and stirrups on either side (Holger Rasmussen, Vesterbrogade 136, Copenhagen, Denmark); the P.P.K. cultivator fitted with brush-cutter and hole-digger (Ets. P.P.K., 45–47 Blvd St. Denis, Courbevoie, Seine, France); the Oliver logger, a logging arch designed in collaboration with the Forestry Commission (J. V. Oliver Ltd., Burton St., St. Pancras, London, W.C.1.); and a portable sawmill (William Reid Ltd., Forres, Scotland).

3603. Informations sur le matériel. **[Notes on equipment.]** *Bois For. Trop.* No. 34, 1954 (77–80). [F.]

Notes, with illustrations, on: the Djinn helicopter (Soc. Nationale de Constructions Aéronautiques du Sud-Ouest, 105 Ave. Poincaré, Paris 16^{e}); the Bussing lorry and pole-trailer (Bussing Co., Nutzkraftwagen GmbH., Braunschweig, Germany); the Skagit mobile crane (Skagit Steel and Iron Works, Sedco Woolley, Wash., U.S.A.); a new motor hole-digger (Les Fils d'Albert-Collet, 41 Rue Cardinet, Paris 17^{e}); and other equipment.

3604. **Loggers' bazaar.** *B. C. Lumberm.* 38 (4), 1954 (38 . . . 69).

Describes briefly, with illustrations, new N. American equipment for roadbuilding and maintenance, felling and cross-cutting, yarding and loading, hauling and miscellaneous uses.

3605. GIORDANO, G. Mecanización en las repoblaciones con fines industriales de la madera. **[Mechanization in stands grown for industrial purposes.]** *Montes, Madrid* 10 (55), 1954 (8–12). [Span.]

Describes and illustrates some Italian tractors and how they are used for planting, felling and extraction in Italian Poplar stands.

31. LOGGING AND TRANSPORT: GENERAL

See also No. 3954.

3606. KATO, S. **Management of logging operations.** Asakurashoten, Tokyo. 1952. pp. 302. [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo No. 3, 1952/53*, 1954 (81). [E.]

Discusses the relationship of mechanization and logging efficiency to costs, the problems of developing road transport, and comparative studies of old and new methods of felling, transport and conversion, and presents a list of modern logging machines.

3607. HARKNESS, W. D. **Mechanized operations.** *Abstr. of thesis*, in *For. Chron.* 30 (1), 1954 (106).

The object of this study was to develop a graphic method for analysing the effects of major operating factors on actual and potential production from mechanized logging operations.

3608. SILEN, R. R., and GRATKOWSKI, H. J. **An estimate of the amount of road in the staggered-setting system of clearcutting.** *Res. Note Pacif. Nthwest. For. Range Exp. Sta.* No. 92, 1953. pp. 4.

Measurements on 8800 acres suggest that ca. 6·2% of the total forest area will be disturbed by roadbuilding and 3·6% by the construction of log dumps; loss of productive land through failure of regeneration on cuts and fills and on roadbeds is estimated at 2·9% and on log dumps at 1·2%.

32. FELLING AND RELATED OPERATIONS

3609. GLÄSER, H. **Criteria for correct logging techniques and best methods of work in European countries.** [*Publ.*] *FAO/ECF Pilot Comm. Logging Tech.* No. *FAO/ECF/Log*/23, 1954. pp. 75.

Analyses replies to a questionnaire on number of workers in a team, choice of tools (including saw-tooth arrangement), and sequence of operations, for felling and primary conversion. Replies were received from Austria, Cyprus, Denmark, Finland, France, Germany, Greece, Italy, Netherlands, Norway, Sweden, Switzerland and the U.K.

322. *Felling Season. Preparatory Measures*

See also No. 3814.

3610. LEHOS, H. Havupuiden rasiinkaato. **[Summer felling of conifers.]** *Metsät. Aikak.* 1954 (2/3), (87). [Fi.e.]

A general account of Finnish "sour felling" experiments [cf. *For. Abstr.* 15 (No. 315)] with conifers and Birch. Evaporation from needles is less than that from leaves but still seems to increase floatability of softwood logs. The logs are left unbarked, so saving logging costs and affording better protection against decay and checks. Costs do not exceed those for winter logging.

3611. RISI, J. L'écorçage chimique des arbres en forêt. **[Chemical barking of trees in the forest.]** *Bull. Serv. for. Québec* (*n.s.*) No. 14, 1954. pp. 13 + 10 photos. 31 refs. [F.]

A review of the literature.

3612. PLATZER, H. B. Über das Ästen von Überhältern und das Kronenabschussverfahren. **[The preparation of standards for felling by branch lopping and by the crown-blasting method.]** *Forstarchiv* 24 (7), 1953 (170–75). 3 refs. [G.]

Deals with the technique of these two methods of reducing felling damage to younger growth under standards. (1) Lopping is best suited to conifers but can be used for hardwoods if their stems are slender enough to be climbed with irons. For conifers at least, it is inadvisable to sever the whole crown: the crown apex should be left to retard the fall, or the stem may break if the ground is uneven. One-sided crown tops, however, should not be left, as they may twist the stem out of the proper line of fall. Clear, dry, windless days in Oct.-Nov. are best for the job. The necessary equipment is listed and illustrated, and the method of working described. It is scarcely possible to quote working times accurately enough for wage assessment, but available figures show that the bulk of the working time is spent in the actual lopping of the branches, and suggest that about 10 trees/day can be lopped by one workman. Times, however, are likely to vary considerably, with tree species, age, number of trees/unit area, crown form etc. The work is exacting and requires well-trained men. Felling is more difficult than with ordinary trees; more wedging is needed to ensure a correct line of fall, and uneven ground must be avoided as much as possible. (2) Crown blasting is chiefly used for large hardwoods. The object is to explode the charge so that the bulk of the crown and large lateral branches are broken off and drop as near as possible to the butt of the tree. For this the bore-hole must not be too low, or the weight of the crown will not be lifted clear but more probably merely tipped over sideways, with damage to the young growth below. Good training and experience are clearly essential. The work is best done immediately after leaf-fall. In the Langelsheim forest district it is done by a team of 3—a foreman-blaster with two assistants—whose equipment and working procedure are described in some detail. Light metal ladders are used for climbing. The charges are inserted in holes large enough for cartridges of 30 mm. diam., and the explosive used is 'Ammon-Gelit 3'. The foreman's work is particularly exacting, and he carries all responsibility for the operations. Timings are very variable, as under (1), and in some cases it has been possible to deal with only 2–3 trees/day.

3613. KISSELEV, I. Du pin pétrifié au bouleau de couleur. **[From petrified Pine to coloured Birch.]** *Rev. int. Bois* 21 (190), 1954 (53–5). [F.]

A popular account of Zakharov's experiments in the impregnation of standing trees with silica salts, dyes, insecticides, fungicides, fire-retardant agents etc. For some time now he has substituted impregnation of freshly felled trees for that of standing trees. Complete and even impregnation is obtained in 2–3 days by simple gravity feed.

323. *Felling and Subsequent Primary Conversion*

See also Nos. 3620 *et seq.*

3614. WILCOX, H., CZABATOR, F., and GIROLAMI, G. **Seasonal variations in bark-peeling characteristics in some Adirondack pulpwood species.** *J. For.* 52 (5), 1954 (338–42). 6 refs.

Describes an instrument for measuring the peeling resistance in grams and plots this for 8 species over the natural peeling season (< 5000 g.) extending from April to August which includes the sap peeling season (< 2000 g.), 30 Apr.–10 Aug. The limits of the natural peeling season are not announced phenologically. The beginning may march with a rise in the mean weekly temperature (> 40° F.). It precedes flushing by 3 weeks and cambial activity by 4. Maximum cambial activity lasts ca. 4–6 weeks in 2 species and peeling continues for ca. 4 weeks thereafter. Hormone-induced reactivation of the phloem precedes the cambial activity, which further promotes bark slipping.

3615. PINÖSCH, D. L'écorçage blanc-blanc du bois à papier. **[Complete barking of pulpwood by drawknife.]** *Forêt, Neuchâtel* 7 (6), 1954 (115–9). [F.]

Describes the organization and operation of hand-barking of pulpwood and discusses the advantage of carrying this out in the forest, where it can be done when logging operations are suspended, especially in the mountains. A suitable rough bench is illustrated.

33. DEGREE OF UTILIZATION AND WASTE. CLEARING THE FELLING SITE. HARVESTING OF SMALL WOOD

See also Nos. 3820–1.

3616. MORAIS, R. **Research Project No. 18. Slash examination, Causapscal River watershed.** *For. Res. Note Causapscal For. Res. Sta.* No. 2, 1954. pp. 2.

Much variation was found in the rate of decomposition of *Picea mariana* slash, according to the methods of logging and skidding employed, but in general its life in normal conditions is 8–9 years, by which time the slight remains of logging debris are concealed by regeneration and undergrowth.

3617. MOLČANOV, A. A. Sroki godnosti otpada, obrazovavšegosja posle požara i vetrovala v uslovijah severa. **[Periods of usability of windthrown and fire-killed timber in the north of Russia.]** *Trud. Inst. Les.* 9, 1953 (261–80). 5 refs. [Russ.]

It has been found that the Spruce forest types with highest yield suffer most from forest fires and windfall. The loss (amount of waste) inflicted is classified into 4 categories: less than 25% (small), 26–50% (medium), 51–75% (high), and over 75% (very high). The effect of insect and fungus pests, and weather factors on fire- or wind-damaged timber is discussed in detail for Spruce and Pine stands. The following results of observation and measurements are tabulated: (1) damage done by Cerambycidae; (2) % of healthy and decayed timber in 3 years' waste in relation to its location and the type of insect pest; (3) degree of damage in relation to d.b.h. and to height above ground; (4) distribution and extent of waste according to fungus species; (5) condition of waste as a function of age, and (6) timber yield from waste.

3618. **Report on the meeting of the Working Party on Coppice Cutting, Niort, 19-21 October 1953.** [*Publ.*] *FAO/EFC Pilot Comm. Logging Tech.* No. *FAO/EFC/LOG*/21, 1953. pp. 12 + 2 dgms. [E.]

Consists mainly of a draft protocol on methods of study of tools, methods, and performances in coppice cutting.

34. STORAGE IN THE FOREST AND AT LOG DUMPS

See also No. 4303.

3619. LUNDBERG, S. Vad kan göras åt ett timmeröverskott? **[What can be done with a timber surplus [:the question of storing windthrown timber until it can be converted]?]** *Skogsägaren* 30 (2), 1954 (32–4). [Sw.]

Proposes a method for storing in clamps (illustrated) some of the large amount of timber thrown by storms in E. and Central Sweden in Jan. 1954. The logs (still frozen if possible) should be close piled on a bed of green slabs or of straw. The sides of the clamp, supported by side logs set at distances of 2·30 m. and anchored by cables, should have a gradient of about 8/10. The top should be made as flat as possible and covered first with a layer of slabs and then with a layer of sawdust at least 10 cm. thick. The whole clamp should then be covered with a loosely packed layer of straw 50–100 cm. thick. If the clamp is established during cold weather, water should be sprayed over it and allowed to freeze; it should in any case be sprayed at intervals, so that the logs are kept moist. The clamp here described is particularly suitable for use where the logs are stored at the mill, but simpler forms, using moss or peat instead of sawdust and straw, can be constructed in the forest.

35. PERFORMANCE MEASUREMENTS FOR DETERMINING PIECE RATES IN FELLING AND RELATED OPERATIONS

See also Nos. 3618, 3954.

3620. GÖRANSSON, R. Tarkistustutkimuksia pinotavaran teosta. **[Check studies on making piled timber.]** *Tied., Metsäteho, Helsinki* No. 95, [1954?]. pp. 8. [Fi.e.]

Reports on the results of observations on 4 men engaged on 2-m. Pine and Spruce pulpwood, barked and unbarked, and 1- and 2-m. fuelwood. Analysis of the time spent on different operations [shown in tables with English legends] shows very much the same division of time as earlier large-scale experiments [see *For. Abstr.* 12 (No. 416)]. *From author's summary.*

3621. MAKKONEN, O. Aisattujen koivupaperipuiden teko. **[Preparing Birch pulpwood barked in strips.]** *Tied., Metsäteho, Helsinki* No. 94, 1954. pp. 2. [Fi.e.] (Repr. from *Suomen Puutalous, Helsinki* 1953, No. 10).

Time studies have been made on barking times, in order to bring unit wages for preparing Birch pulpwood into line with those for other pulpwood. Unbarked 2-m. Spruce pulpwood was used as a basis for comparison in preparing 2-m. Birch pulpwood barked in strips. If the time/linear m. used in preparing 2-m. Spruce is expressed as 100, the corresponding figure for 2-m. Birch barked in strips is 134 provided that the parts of the stem unfit for pulpwood are simultaneously prepared as fuelwood, a separate wage being paid for this work. When the parts unfit for pulpwood are left in the forest the figure is 145. [Cf. *For. Abstr.* 14 (No. 1242].) *From author's summary.*

3622. FEIERABEND, P. Berechnung eines Sortentarifs aus dem EHT. **[Calculation of an "assortment tariff" [for fixing woodcutters' wages] from the EHT.]** *Allg. Forst- u. Jagdztg.* 124 (3; 4), 1953 (64–78; 109–20). [G.g.]

Two types of tariff are employed in Germany—the EHT [*Einheits-Hauerlohntariff* (uniform tariff for woodcutters' wages)], used over the whole of N. Germany, gives mean times for the primary conversion of trees of stated volume classes, and the "assortment tariffs", much used in the south, do the same by categories of timber produced (e.g. long timber, timber-size poles etc.). As these two types of tariff differ in their basis and are not directly comparable, it is proper to ask whether their results are equitable—i.e. give the same timings for equivalent jobs. The present study aims at illustrating a means of comparison in the calculation of an "assortment tariff" from the EHT (which is the more reliably based) with the aid of data from yield tables, assortment tables etc. This is done for Spruce in Baden to demonstrate the methods of calculation involved and to draw some general conclusions, without attempting to make up a complete tariff in which both of the present types should be combined. Results indicate that: (1) The EHT is based on mean times for the primary conversion of individual trees of given volume classes, and *not* on consideration of the mean tree among those felled. (2) The times for primary conversion of long timber vary in relation to the volume of the mean tree and the volume by assortments, but, except for one assortment class, the variation is so small that the working times are more usefully related to the long-timber classes than to the mean timber volume of stands. Times given by the assortment tariff, as here calculated, are shown by a sample computation based on the same data either to agree completely with or to approximate very closely to those that would be given by a tariff based on the volume of the mean tree of a stand. It is thus possible to fulfil the condition of equitable payment for work done. (3) The method of calculation used is important in connexion with performance studies, in that it enables times based on results for single trees to be related to corresponding values for whole stands, which cannot be determined directly without considerable labour and cost. (4) It should be entirely possible to compile a combined tariff giving timings both by the mean tree and by assortments, such that just wages would be paid by either method.

3623. Feierabend, P. Der Einheits-Hauerlohntariff als Sortentariff. **[The "uniform tariff for woodcutters' wages" [recalculated] as an "assortment tariff".]** *Allg. Forst- u. Jagdztg.* 124 (7), 1953 (208–15). 8 refs. [G.]

The method already developed by the author [see preceding abstract] is used to compile a basic tariff for the primary conversion of all tree species in Germany, arranged solely by German standard assortments and based on a long-awaited revision of the EHT which was not available for the calculations made in the previous paper. The assortment tariff is given in tabular form with discussion of the principles and method of compilation and of its relationship to the EHT.

3624. Neumann-Spallart, O. Das Stückmassegesetz nach Hilf in mathematischer Beleuchtung. **[Hilf's 'piece-number/volume law' examined mathematically.]** *Öst. Vjschr. Forstw.* 95 (1), 1954 (18–36). [G.]

[Cf. *For. Abstr.* 14 (No. 3426).] The various stages of felling and primary conversion (felling, trimming, barking and cross-cutting) are studied separately, from two aspects: (1) the relationship between cross-section and stem or log volume (felling and cross-cutting respectively), between bark surface area and log volume (barking), and between branch number and stem volume (trimming). A factor is calculated for the % relationship between figures for 20 cm. and other diameters. (2) Work efficiency expressed as the expenditure of time/100 sq. cm. of cross-section or bark surface area or time/10 branches. The work efficiency factor gives the % relationship between the time for 20 cm. diam. and for other diameters. Results are shown in graphs and tables.

3625. Miyakawa, S., and Miyamoto, M. **[The relation between the efficiency of an operation and size of log. (IV) The relation between the efficiency of logging operations and log size for Momi [*Abies firma*].]** *J. Jap. For. Soc.* 35 (7), 1953 (230–2). [Jap.jap.e.]

Various equations are presented showing the relation of d.b.h. to efficiency, and it is concluded that greatest efficiency is obtained for d.b.h. of 22 cm. *From authors' summary.*

3626. Miyakawa, S., Miyamoto, M., and Osaki, I. **[The relation between the efficiency of an operation and size of log. (V) The relation between the efficiency of logging operations and log size for Hinoki (*Chamaecyparis obtusa*).]** *J. Jap. For. Soc.* 36 (5), 1954 (121–3). 2 refs. [Jap.e.]

Various equations are presented for the relation of d.b.h. to efficiency, and it is concluded that the greatest efficiency is obtained for d.b.h. 66 cm.

3627. Campbell, R. A. **Labor requirements as influenced by volume cut per acre on the Bent Creek Experimental Forest.** *Res. Note Stheast. For. Exp. Sta.* No. 51, 1954. pp. 2. 1 ref.

A study of time reports over 4 years showed that the time/1000 bd. ft. for felling and cross-cutting decreased as the amount felled/acre increased, but that skidding time was not affected.

3628. Platzer, H. B. Über Sonderzusätze für Windwurf und Windbruch: vorläufige Erfahrungen aus einem Schadgebiet des Harzes. **[Special wage supplements for windthrown and windbroken timber: a preliminary report on experience in a damaged area in the Harz.]** *Forstarchiv* 24 (4/5), 1953 (121–7). 34 refs. [G.g.]

Briefly describes a tornado that developed in the Harz on 5 May 1952 and the types of damage caused (to Spruce and Beech), and examines the factors affecting the difficulty of logging the damaged timber—some making the job more difficult, others facilitating work, as compared with a normal logging operation. The special supplements paid, averaging between 28 and 50% according to species and wage tariff concerned, were based on estimates made after careful inspection of each compartment. Records of work performances and pay (tabulated by compartments) are used to show that even in the worst cases the supplements could be kept at a reasonable level and still permit good earnings. Each case of such damage presents its own special features and standard supplements cannot be laid down in advance. Nevertheless, the special estimates of supplements for each case must be made with due consideration of factors that make the work easier, as well as those making for greater difficulty.

36. TOOLS, MACHINES AND EQUIPMENT FOR FELLING AND RELATED OPERATIONS

See also Nos. 3602, 3604, 3606, 3609, 3618, 4120.

3629. Randall, C. A., and Ross, J. D. **Recently developed barking machinery**. *Rep. Ore. For. Prod. Lab.* No. *E*–1, 1953. pp. 47 + 14 photos. 60 refs.

Describes some 38 barkers manufactured in N. America.

3630. Kaminsky, G., and Lünzmann, K. Über die statistische Auswertung von Sägeversuchen. [**The statistical evaluation of sawing tests.**] *Forstarchiv* 24 (4/5), 1953 (128–30). 8 refs. [G.g.]

A statistical analysis is made of the results of tests to compare three types of cross-cut toothing—(1) double lance and single raker teeth, alternating, (2) asymmetrical peg teeth with a sharpness angle of 42°, and 12° negative hook, (3) ditto but with 8° negative hook—all on 1-man saws used by trained sawyers on slightly frozen Spruce logs of 42% moisture content and 26·7 cm. diameter, 20 tests being made with each saw. As regards working tempo (double strokes/min.), (1) was significantly slower than (2) and perhaps slower than (3), though further tests would be needed to establish significance. In work efficiency (expressed as double strokes/sq. cm. cut), (1) ranked significantly lower than the other types, of which (3) was probably the more efficient. Performance (sq. cm. cut/min.) showed significant differences between all types, in the ascending order (1), (2), (3). The relatively poor showing of (1) is presumably due to the fact that in 1-man work the full effect is exerted only on the 'push' stroke.

3631. Steinlin, H., Grandjean, E., and Egli, R. Einige Untersuchungen über die Schnittleistung verschiedener Sägen. [**Trials of cutting performance of various saws.**] *Mitt. schweiz. Anst. forstl. Versuchsw.* 28, 1952 (88–108). 10 refs. [G.g.f.]

Statistically replicated tests, eliminating extraneous effects (sawyers, stance, position, species etc.), were made on two-man cross-cut saws, 165 cm. long × 8 and 12 cm. wide, of 3 types of tooth arrangement: (*a*) uniform dogteeth (triangular), (*b*) 2 lance teeth separated by one raker, and (*c*) groups of 4 lance teeth connected by bridges, separated by one raker. Work rate was regulated by metronome, and O_2 consumption and CO_2 production were measured through face masks. Energy consumption/sq. cm. cut was least where cutting time/sq. cm. was shortest, varying almost directly as the work done. Cutting time is thus a sure criterion of efficiency for the saws tried. For both broadleaved species and conifers, and for felling and cross-cutting, the wider saws of (*b*) and (*c*) type proved distinctly superior and this is not due to extra weight. Type (*a*) was distinctly inferior, with equal performance in both widths. The shortening of the raker teeth by 0·7 mm., greater pressure and slower stroke, contrary to local practice, will increase work done with less energy expenditure.

3632. Sundberg, U. **The use of power saws in forestry operations.** [*Publ.*] *FAO/EFC Pilot Comm. Logging Tech.* No. *FAO/EFC/LOG*/19, 1953. pp. 62. 34 refs. Price 2*s*. 6*d*.

Analyses and discusses data obtained by a questionnaire sent to member countries (answers received from Austria, Belgium, Denmark, Finland, France, Germany, Iceland, Italy, the Netherlands, Norway, and Sweden). The 1-man and 2-man motor chain saws are the most important types and are used for felling, cross-cutting, and sometimes even for branching. The use of power saws is believed not to multiply accidents; it makes felling less heavy work but vibration and exhaust fumes can be a nuisance and sometimes cause serious injuries.

The relative efficiency of power saws and hand saws measured as production in sq. cm./min. is ca. 3·5: 1 for one-man, and ca. 6: 1 for 2-man saws, but time-saving by the use of power saws decreases with decreasing diameter, and a diameter limit will be found, below which cutting is performed faster with hand saws.

3633. **Power saws—models and specifications.** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1355 (*B*–7–*c*), 1954. pp. [3].

A tabulated summary of replies to a questionnaire submitted by the Committee on cutting tools to manufacturers of power saws in Canada, United States and Europe.

3634. Stephens, T. K.; Cowan, T. A.; Ballantyne, S.; Kerr, L. G.; Douglas, L. C.; Kirkpatrick, R. E.; Morris, G. H. **The proper use of the power saw as a cutting tool: a panel discussion [on maintenance, cutting techniques, crew organization, and supply of parts and servicing].** *Pulp Paper Mag. Can.* 55 (6), 1954 (136 . . . 150). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1369 (*B*–7–*c*).)

3635. Rehschuh, D. Ein- und Zweimann-Motorsägen. [**One- and two-man power saws.**] *Forstarchiv* 25 (1), 1954 (24). [G.] [Institut für forstliche Arbeitswissenschaft (Iffa), Reinbek.]

Specifies *inter alia* the length of cut, weight, h.p., fuel and fuel consumption, price, and cost of spare chain for: (*a*) several 2-man saws (Dolmar CL and CK, and Stihl KS and BDN, all sword-type; Dolmar CB 50 and Stihl RBB, both bow-type); and (*b*) two 1-man saws, both sword-type (Dolmar CP and Stihl BL). Very brief general notes are appended on their utility in felling and cross-cutting, with an estimate of the approximate net cost per working hour (including amortisation and repairs) of 2 saw types from group (*a*) and the 2 saws of group (*b*), based on working "lives" of respectively 3000 and 2000 hr.

3636. Pavlov, È. A. Mehanizmy dlja obrezki sučjev. [**Trimming appliances.**] *Mehanizacija Trudoemkih i Tjaželyh Rabot, Moskva* 1953 (3), (11–6). [Russ.] L.S.

Illustrates and describes the construction and operation of a number of stationary and portable trimming appliances and tools, viz. (1) stationary trimming appliances: (*a*) with a rotary cutting head of the "floating" type; (*b*) with an annular head having fixed knives; (*c*) as (*b*) but with pointed electric or pneumatic hammers replacing the fixed knives; and (*d*) with a pair of chain saws; (2) intermediate semi-stationary type "Balos", with a flexible saw loop—either this or the stem being moved to effect the cutting, and (3) a number of portable trimming tools with electric drive (chain saws, circular saws). The merits of all appliances are discussed.

3637. **Portable Brushmaster Saw.** *Equipm. Note, FAO* No. *E*.2.54, 1954. pp.1.

Specification and photograph in action of the saw, which is designed for cutting brush and trees up to 4 in. (10 cm.) in diameter, and is made by Brushmaster Saw Inc., 843 Emerald Street, Keene, N.H., U.S.A.

3638. **Hydra wedge.** *Equipm. Note, FAO* No. *C*.5.54, 1954. pp. 1.

Describes and illustrates a hydraulic wedge for tree felling, weighing ca. 20 lb. (9 kg.) and measuring 24 in. (60 cm.) long. It consists of a manually operated hydraulic pump, a power cylinder, and a tapered wedge attached to the end of the piston rod, giving a lifting capacity of 90,000 lb. (40,000 kg.). It is manufactured by Hafford Machine Works Inc., 1700 East Grand Av., El Segundo, Calif.

3639. HAKKARAINEN, A. E. Järeiden pölkkyjen halkaiseminen räjähdyskiilalla. **[Splitting large logs by means of an explosive wedge.]** *Tied., Metsäteho, Helsinki* No. 98, 1954. pp. 2. [Fi.e.] (*Repr.* from *Suomen Puutalous, Helsinki* 1954 (2), (63, 78).)

Describes [with photographs having English legends] the use of an explosive wedge in splitting large knotty fuelwood logs at storage sites. The wedge might also be used at mills to split pulpwood logs too big to feed into the chipper or barker. *From author's summary.*

3640. EKLUND, R. Pinopuutavaran käsittelystä. **[Handling piled wood in logging.]** *Tied., Metsäteho, Helsinki* No. 97, 1954. pp. 20. 34 refs. [Fi.e.]

Discusses bundling methods, and equipment (mainly N. American) used in assembling and handling the bundles. Illustrations and tables have English legends.

3641. EVERSOLE, K. R. **Using the climbing rope and saddle in forestry.** *J. For.* 52 (4), 1954 (284–6).

Describes (with photos) the use of the so-called "climbing saddle", actually a safety belt, for cone-picking, pruning etc.

37. TRANSPORT

371. *Loading and Unloading*

3642. KANTOLA, M. **The loading of coniferous sawlogs on trucks.** [*Publ.*] *FAO/EFC Pilot Comm. Logging Tech.* No. *FAO/EFC/Log*/20, 1954. pp. 167. 41 refs.

This study is largely taken up by consideration of the methods involved in a work study on this subject. Manual rope loading in summer by 4 men was taken as the basis of comparison, and a number of mechanical loading devices were compared. Boom loaders are the most suitable for use on small dumps.

372/377. *Land Transport*

See also Nos. 3569, 3602–7, 3640.

3643. STEINLIN, H. Zur Methodik von Rückversuchen. **[Methods in performance studies of skidding [in Switzerland].]** *Forstarchiv* 24 (4/5), 1953 (115–9). 6 refs. [G.g.]

Outlines the main objects of such studies—viz. choice of suitable work organization for a given skidding method in relation to tree stand and terrain, comparison of different skidding methods and appraisal of new equipment, and estimation of costs with special reference to questions such as the planning of the road network—emphasizing the complexity of the factors involved. Experience so far indicates that above a certain minimum skidding distance, which will vary with local conditions, time and cost may be regarded as directly proportional to distance, so that they may be compared by reducing the figures to some standard distance. The second important measurable factor is the number of loads transported, and the best basis for performance comparisons appears to be time per load per 100 m. To bring in size of load, 7 "load classes" have been employed, varying from $< 0{\cdot}50$ to $> 3{\cdot}0$ cu. m.; this seems to be justified since size of load has less influence than distance and number of loads. The simultaneous but differing costs/unit time of human labour and of horses and/or motors are reduced to a common basis of man-minutes. This enables numerical comparisons to be made of the influences of equipment, organization and terrain. Several examples are given to show the practicability of the method.

3644. FIELDING, J. R. **A pulpwood flume system.** *Tappi* 37 (3), 1954 (113–5). P.R.

Illustrated description of a flume system designed in the U.S.A. for an average capacity of 200 cords/hour.

3645. HILF, H. H. Das Auf- und Abseilen von Rückeschliffen am Steilhang. **[Up- and downhill cable hauling of skidding sledges on steep slopes.]** *Holz-Zbl.* 80 (32), 1954 (417–8). [G.]

Illustrated description of a new economical method for downhill skidding of relatively small quantities of different timber assortments, including poles. A Mako winch with a 4-h.p. internal-combustion motor is used both to control the loaded sledge (1–1·5 cu.m. of wood) sliding down a slightly evened-out skidway (gradient up to 60°) and for pulling the empty sledge uphill. This uphill pulling can be done either directly (single cable) or with 1 or 2 pulleys (double or triple cable), while the skidding is usually done with a single or double cable. The performance and capital and operational costs are given.

3646. **[Job analysis of log-hauling operations by tractor-drawn sledges on snow.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 65, 1953 (219–31). 4 refs. [Jap.]

A detailed analysis is presented for each stage of 36 trips using small crawler tractors drawing 2 sledges.

3647. Yamawaki, S. **[An apparatus for testing the runner friction of sledge models and some preliminary experiments.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 65, 1953 (127–34). [Jap.e.]

The apparatus is illustrated with photographs, and some results are given in tables with English legends.

3648. Kato, S., and Maruyuma, M. **[The vibration method of tension measurement in skyline cables and its application.]** *J. Jap. For. Soc.* 35 (2), 1953 (59–61). [Jap.jap.e.]

3649. Lloyd, A. H. **Extraction of timber by skyline crane.** *Aust. Timb. J.* 19 (11), 1953 (812–3). [Imperial Forestry Institute, Oxford.]

Examines the limitations of the skyline crane in relation to topography and type of forest.

3650. Koroleff, A., and Collier, R. D. **Wire skidding: wood transportation by gravity over a suspended wire.** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 92 (*B–8–g*), 1954. pp. 137 + 1 dgm. + 1 photo. 36 refs. Price $2.00.

Discusses the development and different systems, technique, production in skidding by fixed monocable, cost, research on multiple-span wire skidding, and the possibilities, with appendices on development of single-span wire skidding, stress and safety calculations, wire skidding in pulpwood logging (by *F. A. Harrison*) and the use of supports.

3651. **Krasser cable winch.** *Equipm. Note, FAO* No. *C*.4.54, 1954. pp. 1.

Description, with illustrations, of a cable winch for use in extraction, made by A. Krasser, Köflach-Edelschrott, Steiermark, Austria.

3652. Aniansson, G., and Norén, O. Skogtransporter med direktdrivna kärror vintertid. **[Forest transport in winter using trailers with direct power drive.]** *Lantmannen, Stockholm* 35 (16), 1951 (315–7). [Sw.] X.

Various trials showed that trailers with direct power drive gave much better performance in winter than ordinary trailers, and could carry 2–3 times normal trailer loads.

3653. Piškula, F. Motorobot PF–6 a jeho použití v lesním hospodářství. **[The small two-wheel tractor "Motorobot PF-6" and its use in forest work.]** *Lesn. Knihovna* (*malá Řada*) No. 25, 1953. pp. 51. 4 refs. [Cz.] Price *Kčs*. 20.

Illustrated description of the design, servicing, and operation of this tractor, which develops a tractive force of 80–350 kg. (depending on the road surface and tyres). Besides skidding, the tractor can be used for driving a grass-mower, a circular saw, a plough, hoe, roller, sprayer, etc., which are also illustrated and described.

378. *Water Transport*

3654. I Finland publicerad flottningslitteratur. **[Literature on floating published in Finland (1880-1953).]** *Årsb. Finl. Flottarefören.* No. 22, 1953 (1954), (125–55). [Fi.Sw.]

3655. Staël von Holstein, J.; Månsson, T.; Sundberg, U. Flottning eller biltransport. **[Floating or lorry transport (with discussion).]** *Årsb. svenska Flottledsförb.* No. 27, 1953 (1954), (5062–103). [Sw.]

Discussion of the relationship between floating and road transport in Sweden, with details of the quantities transported and relative costs.

3656. Lundén, B. Om buntflottning och dess kombinering med biltransport. **[Bundle floating and its use in combination with lorry transport.]** *Årsb. svenska Flottledsförb.* No. 27, 1953 (1954), (5107–14). [Sw.]

Discusses some of the methods and equipment (illustrated) used in floating systems where the timber is bundled and transported both by road and by water.

3657. Eklund, R. Uittotekniikan viimeaikaiset kehityslinjat. **[Recent technical developments in floating.]** *Metsät. Aikak.* 1954 (5), (155 . . . 164). [Fi.e.]

Equipment, including that used for bundling, loading, booming, turning bundles, and sorting and improvements to sluices are described and illustrated [by photographs with English captions].

3658. Rennerfelt, E. Om skador och flytbarhet på bomvirke. **[Damage to and floatability of boom timber.]** *Årsb. svenska Flottledsförb.* No. 27, 1953 (1954), (5131–3). [Sw.]

The main causes of damage to boom logs are splits, usually starting at the fastenings, and subsequent fungus attack. Figures are given showing increased uptake of water and slower drying out of decayed wood. The possibility of preservative treatment is discussed.

3659. Eklund, R. Lauttausalusten käyttö ja suunnittelu. **[Design and use of tow and warping boats.]** *Metsät. Aikak.* 1954 (4; 5), (150–2; 196 . . . 202). 9 refs. [Fi.e.]

38. FOREST ENGINEERING

381. *Materials* (*including Explosives and their Use*)

See Nos. 3450, 3556, 3612, 3639, 3671–2.

382. *Buildings. Logging Camps etc.*

3660. VanSlyke, A. L. **Research Project No. 22. Fuel consumption test—oil-burning stoves. Oil stove and Jotul stove trials in occupied camps.** *For. Res. Note Causapscal For. Res. Sta.* No. 1, 1954. pp. 4.

On the basis of these experiments in the Gaspé Peninsula it is concluded that, at present prices, if fuelwood costs less than $24.28/cord it would be cheaper to heat logging camps with Jotul wood-burning stoves, but if it costs more it would be more economical to use oil. Oil stoves are in many ways more convenient, e.g. in ease of stoking.

3661. VanSlyke, A. L. **Research Project No. 22. Alleviation of creosoting in Jotul stove operation.** *For. Res. Note Causapscal For. Res. Sta.* No. 3, 1954. pp. 2 + 1 tbl.

Tests were made to discover the conditions under which wood-burning stoves used to heat logging camps produce creosote in sufficient quantities to create a strong odour, stain the walls, and sometimes form puddles on the camp floor. Recommendations are made for measures to prevent this.

383. *Roads and Bridges*

See also No. 3604.

3662. Lünzmann, K. Neuerungen im Waldstrassenbau. **[Innovations in forest road-building.]** *Forstarchiv* 23 (11/12), 1952 (217–24). 111 refs. [G.g.]

Reviews recent world literature on methods of construction, roadbuilding machines, and the economics of forest roads.

3663. Young, H. E., and Wing, L. A. **Use of air photos for location of truck roads and road-building materials in Maine.** *Tech. Note Univ. Me. For. Dep.* No. 20, 1953. pp. 2.

3664. Allouard, P. La route forestière en pays tropical. **[Forest roads in the tropics.]** *Bois For. Trop.* No. 33, 1954 (15–36). [F.e.span.]

Discusses the making, lay-out, and maintenance of roads in tropical forest. The following principles are laid down: no gradients above 6%; hollows should be filled up; the road should be completed at least one year before opening; camber on slope should be such as to facilitate run-off; loaded vehicles should not run on wet roads; the use of a motor grader is essential in road construction.

3665. Allouard, P. La route forestière en pays tropical (suite). **[Forest roads in the tropics (continuation).]** *Bois For. Trop.* No. 34, 1954 (29–44). [F.f.e.span.]

Deals with choice of design for different conditions, with particular reference to erosion on steep gradients; upkeep and repair; road metal; class of vehicles to be permitted to use roads.

3666. Aḱimovski, R. Obeležuvanje serpentini na šumskite patišta. **[Setting-out of S bends in forest roads.]** *God. Zborn. zemj.-šum. Skopje* 4, 1953 (141–81). 8 refs. [Maced.maced.g.]

Analyses several forms of S bends and attempts at providing a theoretical basis for setting them out on the spot. Subdivides the S bends into those requiring only one auxiliary curve, and those requiring 2 curves. From the field-work viewpoint, the bends are divided into those whose auxiliary curves have a well defined peak and those where the peak is arbitrarily chosen.

3667. Trimble, G. R. Jr., and Weitzman, S. **Soil erosion on logging roads.** *Proc. Soil Sci. Soc. Amer.* 17 (2), 1953 (152–4). L.S.

A study was made of erosion on skid roads before, during, and after experimental logging in West Virginia, with particular attention to gradient, length of slope, intensity of use, and vegetation and climatic factors. Recommendations are made for reducing erosion. Drainage either by diversion ditches or 'lets' is essential.

3668. Tuffier, M. Les nivelleuses actuellement fabriquées dans le monde. **[Motor graders currently manufactured throughout the world.]** *Bois For. Trop.* No. 35, 1954 (33–51). [F.]

Tabulates data on make of engine, h.p., speed, dimensions, blade, angle of rotation, scarifier, weight, tyres, and special features of 52 self-propelled and 17 tractor-drawn graders, with notes on grader blades that can be fixed to a long chassis or the rear of a tractor.

3669. Cross, G. E. **Economics of crushed gravel for use on bush roads.** *Pulp Paper Mag. Can.* 55 (4), 1954 (120). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1370 (*B*–8–*b*).)

Discusses experiences of the St. Lawrence Corporation Ltd.

385. *Drainage, Irrigation, Sedimentation*

See also No. 3556.

3670. Bragée, A. Maskinell dikning. **[Mechanical methods in drainage.]** *Skogen* 41 (9), 1954 (164–5). [Sw.]

Equipment used for mechanized digging of drainage ditches in Föllinge, Jämtland, consists of a rotary digger in a frame mounted on a sledge, which can be raised or lowered hydraulically. The digger is driven by a 90-h.p. lorry engine. The assembly is towed by a Fordson Major diesel tractor with 14-in. tracks. A single run with the machine gives a ditch 0·4–0·6 m. deep, but the normal method is to make a return run on the opposite side of the ditch and this gives a depth of 0·7–0·9 m., at a rate of 400 m./hr. A further trip will give a depth of 1–1·2 m. at a rate of 250 m./hr. All the earth dug from the ditch breaks up and is thrown by the machine about 20–25 m. from the ditch, evenly distributed.

3671. Lindberg, K. Senaste nytt från dikningsfronten. **[The latest news on drainage.]** *Skogen* 41 (5; 11), 1954 (93–4, 106; 190–2). [Sw.]

Discusses the relative effectiveness and costs of ordinary dynamite and Nitrolit [see *For. Abstr.* 14 (No. 1274)] and makes recommendations for their use on different sites.

3672. Lundén, B. Dikessprängning: några erfarenheter frå Värmlands län. **[Draining with explosives: some results from Värmland county.]** *Skogen* 41 (12), 1954 (208–9). [Sw.]

In trials in 1953, costs of labour and materials amounted to Kr. 1.37/m. as against Kr. 1.75–1.80 for hand labour. There was a saving in labour of about 80%. [Cf. *For. Abstr.* 15 (No. 1455).]

4. FOREST INJURIES AND PROTECTION

See also Nos. 3293, 3321, 3326, 3330.

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. *Natural and Biological Control*

See Nos. 3705, 3776, 3785–6, 3795, 3806, 3809–10, 3842–6.

414. *Chemical Control*

See also Nos. 3701, 3709, 3787–9.

3673. VOIGT, G. K. **The effects of fungicides, insecticides, herbicides, and fertilizer salts on the respiration of root tips of tree seedlings.** *Proc. Soil Sci. Soc. Amer.* 17 (2), 1953 (150–2). 10 refs. L.S.

The effects were studied of various compounds, including, calomel, Spergon, Thiosan, chlordane, Stoddard oil and common fertilizers, on the respiratory processes of growing roots by means of manometric techniques. (1) The rate of O uptake was measured in seedling root tips in direct contact with solutions or suspensions of different compounds. (2) Respiration was observed in root tips of seedlings grown in cultures treated with the chemicals. The measurements show that some of the compounds inhibit the metabolism of roots of young seedlings. Considerable variations were observed in different tree species. In general Jack Pine and Red Pine are more sensitive than White Pine and Black Locust. The toxic compounds are less deleterious to growth when an adequate supply of nutrient salts is present, and exert the greatest depressive influence during the first 3 weeks of seedling growth.

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. *Air Currents*

See also Nos. 3617, 3628, 3933.

3674. JENSEN, C. F. Orkanen den 11. Februar 1952. **[The hurricane of 11 Feb. 1952.]** *Dansk Skovforen. Tidsskr.* 37 (5), 1952 (290–8). [Dan.]

Notes from the Thisted district of Denmark, where the storm was most severe, individual gusts having velocities of up to 37 m./sec. The storm was accompanied by wet snow, heavy locally and forming ice as the temperature dropped, so that the crowns were often loaded with both ice and frozen snow. Damage by windthrow was very unevenly distributed, and—partly owing to the heavy thinnings of the past 20 years, which have increased the wind resistance of the residual trees—less serious than might have been expected [no figures given]. In Larch, only a few diseased trees were thrown, and Spruce stands with a considerable admixture of Larch appeared more resistant than pure Spruce—perhaps owing to the leafless Larches forming "valves" through which air could readily escape during strong gusts. In general, Silver Fir suffered less than Norway Spruce, but the susceptibility of the latter varies with the incidence of root and butt rot; sound Norway and Sitka Spruces appeared to be about as windfirm as Fir. Damage was naturally worse in older than in younger stands. As regards site, it was most serious in low-lying spots with wet, yielding soil, and on shallow clayey soils. Such places might well be planted with broadleaved species and Larch, and these might also be used for mixing with Spruce.

3675. SOEST, J. VAN. Stormschade aan Douglas. **[Storm damage to Douglas Fir.]** *Ned. Boschb.-Tijdschr.* 26 (4), 1954 (89–99). [Du.e.]

An enquiry, covering nearly 1700 stands on about 2500 ha., made after the storm on 1 Feb. 1953, showed that damage was serious where Douglas Fir had been planted on old arable land, where the higher accumulation of nutrients in the top layer causes formation of a flat root system and the relatively high pH encourages attack by *Fomes annosus*. Damage was also associated with close spacing, late and sudden thinnings, and stands planted under shelter, e.g. of Scots Pine. Recommendations for reduction of future damage are: avoidance of old arable land with a high water-table; planting in clear-felled areas; maximum of 4000 plants/ha.; and moderate thinnings every 2–3 years from the age of 15.

3676. CHILDS, T. W., and CLARK, J. W. **Decay of windthrown timber in Western Washington.** *For. Path. spec. Release U.S. Bur. Pl. Ind.* No. 40, 1953. pp. 20.

Measurements of decay in windthrown Douglas Fir, Sitka Spruce, Western Hemlock [*Tsuga heterophylla*] and Pacific Silver Fir [*Abies amabilis*] indicate that the Hemlock and Silver Fir decay rapidly in all local conditions in this region, that Sitka decays fairly rapidly, and that Douglas heartwood is quite durable though its sapwood decays fairly rapidly. Temperature is probably the principal factor, other than diameter, determining the rate of decay in fallen trees. In all species decay is usually negligible in the first year after windthrow but is well started in the sapwood by the end of the second year.

3677. BLYTH, A. W. **Reduction of growth in conifers caused by red belt in the subalpine region of Alberta.** *Silv. Leafl. For. Br. Can.* No. 79, 1953. pp. 2 + gph.

A number of Lodgepole Pine and Douglas Fir were examined from trees in the Kananaskis Forest affected by "red belt"—a phenomenon supposed to be due to the movement of Pacific air over the Rockies by the chinook winds [cf. *For. Abstr.* 13 (No. 3941)]. The needles turn red and subsequently die. The conclusions drawn from the study are that: (1) for the 3 years following the incidence of red belt, reduction in diameter growth is closely proportional to the amount of crown damaged; (2) up to 3 years thereafter there is little evidence of growth recovery in damaged trees; (3) the tallest trees in a stand are the most susceptible and the damage is greatest in the upper part of the crown; (4) many trees are permanently damaged, having dead tops and tops with leaders developed from lateral branches.

3678. Day, W. R. **Observations on local climate in an area in which Japanese Larch has been severely affected by cambial injuries.** *Rep. imp. For. Inst., Oxf. 1952/53*, 1954 (14).

Observations were made for 9 days at the end of March and beginning of April when a cold wind was blowing with some snow. The indications obtained were that, while some slight injuries had been caused by radiation frost, the main damage was caused by exposure to cold winds.

422. *Temperature Influences. Frost. Heat. Drought*

See also Nos. 3273, 3365, 3504, 3520, 3529–30, 3678, 3756–8, 3763, 3824, 3832–6.

3679. Day, W. R. **Collapse of wood owing to drought.** *Rep. imp. For. Inst., Oxf. 1952/53*, 1954 (15).

Collapse occurred in a small area of Japanese Larch on a shallow but fertile soil. Growth was normal until crown competition became appreciable and collapse was then severe during the period of transition from the early fast rate of diameter increment. The type of collapse is similar to that recorded by Lutz as occurring in White Spruce growing over frozen subsoils in Alaska. [Cf. *For. Abstr.* 13 (No. 3945)].

3680. Mork, E. Varmeskytte på granplanter og midler mot denne. **[Leafcast of Spruce caused by physiological drought and methods of preventing it.** (With discussion).] *Årsskr. norske Skogplantesk. 1953*, 1954 (91–102). [Nor.]

Discusses leafcast in nurseries caused by warm weather in early spring which dries out the shoots while the roots are still frozen. This occurs most frequently in areas where there is little snow and the frost penetrates deep into the soil. Methods of avoiding the damage include covering the nursery beds in winter, lifting the plants in autumn and heeling them in for the winter either in the nursery or in the forest in a more favourable position, watering on warm dry days in spring, dividing the nursery with hedges, or sowing winter rye between the rows.

423. *Precipitations*

See also No. 3674.

3681. Haralamb, A. Pagube cauzate de polei in păduri. **[Damage caused by glazed ice in the forest.]** *Rev. Pădurilor* 68 (4), 1953 (35–6). [Rum.rum.russ.]

Notes on damage caused by a glaze frost in Feb. 1953.

424. *Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.*

See also No. 3485.

3682. Linde, R. J. van der, and Meiden, H. A. van der. Enkele voorlopige resultaten van een onderzoek naar de invloed van de inundatie 1953 op houtsoorten. **[Some preliminary results of an investigation on the effect of the 1953 floods on tree species.]** *Repr.* from *Tijdschrift der Nederlandsche Heidemaatschappij, Arnhem* Jan. 1954. pp. [13]. [Du.e.]

An investigation was made during 1953 on the effect on soil and vegetation of the floods in the S.W. Netherlands in February of that year. Different species showed different reactions to damage, but in most the leaves, first those at the top and on the S.W. side of the crown, lost their colour and died off. This first crop of leaves was followed by one or more further crops (some species, notably Ash, Maple, Lombardy Poplar and Chestnut, produced leaves continuously during several months, often from July to Nov.), smaller than the early leaves, yellowish green and non-turgescent and often soon withering. Damage was considerably greater to trees that had been pruned just before the floods. Immediate replanting in the flooded areas is not recommended but preliminary information on the comparative resistance of softwoods and some 35 hardwoods to sea water is given. All the conifers, except *Araucaria* which seems more or less resistant, were susceptible. Damage to some hardwood species, including Hawthorn, Birch, Ash and Beech, appears to have been very complicated and no estimate of their resistance can be given yet. The following species might be considered for planting in spring 1954 if the C–figure (grams NaCl/litre soil moisture) in the preceding autumn did not exceed the figures in brackets: *Lycium halimifolium, Tamarix gallica, Populus alba* and *P. canescens* (9), *Quercus robur, Robinia pseudoacacia* (8), *Ligustrum, Ulmus campestris* (7–8), *Salix alba, S. calva* (6), *Alnus glutinosa* (5), *Platanus acerifolia* (4–5), *Acer campestre, Sambucus nigra* (4), *Populus euramericana, P. nigra* var. *italica* (3–4), *Alnus incana* (3). The desirability of postponing planting is, however, again emphasized.

3683. Bolle-Jones, E. W. **Effect of mineral status on the concentration of rubber in *Hevea brasiliensis*.** *Nature, Lond.* 173 (4406), 1954 (690). 4 refs. [Rubber Research Institute of Malaya, Kuala Lumpur].

Experiments were made with seedlings grown in sand cultures in various conditions of nutrient deficiency. The results demonstrated that nutrient deficiencies caused a reduction in the rubber concentration of the bulked stems and petioles in the earlier stages of growth only, before the differential effect of mineral treatment on yield response had become acute. The total rubber content of the plant, was, however, governed by the dry-weight production, which in turn was dependent on mineral status. Accordingly it must be expected, under field conditions, that where nutrient deficiencies are sufficiently severe to cause an appreciable decrease in the vigour and dry-weight production of the plant, a smaller yield of rubber per tree will result.

425. *Chemical Influences (Atmospheric)*

3684. Ferda, J. Odolnost lesních dřevin proti kouřovým plynům. **[Resistance of forest trees to**

smoke gases.] *Lesn. Práce* 32 (10), 1953 (458–64). [Cz.]

The principal factors involved in resistance are: period during which foliage remains on the tree; anatomical structure of the leaf; provenance and age of trees, and their situation. Lists of smoke-sensitive, moderately sensitive, and resistant tree and shrub species according to Krasinskiĭ and to Rubner are presented. The damage done to forests in the Krušnohoří (Erzgebirge) region of Bohemia by smoke is described. Most sensitive are: Fir, Spruce, Ash, and probably Lime; moderately: Pine, Beech (sensitive when young), Birch, Rowan, Sycamore Maple, Hornbeam, Alder; resistant: Larch, *Pinus nigra*, Oak, Poplars, Willows, Norway Maple, Elms.

3685. Oksbjerg, E. Saltnedslag, en klimatisk faktor. **[Salt deposition, a climatic factor.]** *Dansk Skovforen. Tidsskr.* 37 (8), 1952 (375–89). [Dan.] [Statens forstlige Forsøgsvæsens afdeling for hede- og klitskove.]

The effect of wind alone is insufficient to explain the unilateral reddening of crowns and needle-cast in Norway Spruce plantations in northern and western Jutland. The suspected agent was salt, but since the salt carried in rain could scarcely account for the symptoms, enquiries were made of telegraph, telephone and power companies in Denmark, Norway and Sweden,as to the incidence of insulation failures on lines near the coast. All companies reporting such troubles agreed in attributing them to the effects of onshore winds in dry or frosty periods followed by moist weather or fog, but no rain. With high evaporation rates, salt-spray particles are evaporated to dimensions such that they can be held suspended as concentrated droplets in the atmosphere. After settling, these or the crystals forming from them in dry weather, will again gain water in moist weather and then give rise to insulation failures. Rain stops such troubles by washing the salt away. Deposits of this kind would explain the incidence of damage to Spruce and it is suggested that their hygroscopicity and high osmotic value may be responsible for removal of water from the needles. If this view is correct, they may constitute an important ecological factor on many coasts; on mountainous coasts, however, it is likely that precipitation will more or less eliminate the effect—as perhaps in some regions of Norway. It is possible that, as Sitka Spruce is not so damaged in Denmark, this species—characteristic of west-facing slopes on the Pacific Coast—may owe some of its competitive ability to tolerance of salt on the foliage. In Denmark, other species resistant to the coastal climate are *Abies alba* and *Picea omorika*, and it may be worth while to study the needle structure of the resistant species as compared with the susceptible Norway Spruce. It may also be of interest to see whether "grey" montane races of Norway Spruce, presumably adapted to strong wind, might do better on the Danish coast, especially as Løfting believes that the survivors in damaged plantations show a high proportion of "grey" types.

426. *Electrical and Cosmic Influences*

See Nos. 3690–1.

43. FOREST FIRES

3686. Shakeshaft, E. M., Stringer, K. C., Baxter, B. F. W., and Wolanska, I. G. **References to scientific literature on fire. Part V, 1951.** *Library Bibliography, Joint Fire Research Organization, Fire Research Station, Boreham Wood, Herts.* No. 5, Part V, [1953]. pp. 60. P.R.

550 references (worldwide) with a name and a subject index including: extinguishers, fire retardants, and forest-fire detection, fire fighting and statistics.

3687. Charters, H. **Fires in state forests in the years 1929-1952.** *For. Rec. For. Comm., Lond.* No. 23, 1954. pp. 31. Price 1*s*. 6*d*.

Gives statistics of (1) incidence and loss by causes, year, months, times of day, sizes, age classes, and periods; (2) scale of protection and loss by years, periods, and age classes; with a discussion of economic balance between expenditure on protection and loss.

431. *Predisposing Factors and Causes. Fire Danger. Fire Behaviour*

3688. Countryman, C. M., and Intorf, P. H. **A fire season severity index for California national forests.** *Misc. Pap. Calif. For. Range Exp. Sta.* No. 14, 1953. pp. 7. 1 ref.

3689. Byram, G. M. **Atmospheric conditions related to blowup fires.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 35, 1954. pp. 31. 6 refs.

Analyses a number of case histories and summarizes their dates, wind-speed profile type, final size of fire and general behaviour. [Cf. *For. Abstr.* 13 (No. 1296).]

432. *Prevention and Control*

See also No. 4415.

3690. **Latest big fire prevention question—can we stop lightning?** *Timberman* 55 (5), 1954 (58, 60).

Storm clouds in California were treated, when the storm was well developed and lightning could be observed striking the ground, by releasing from an aircraft into the central convection currents chemicals that change the cumulus and cumulonimbus clouds to stratus type. A total forested area of 15,000 sq. miles was treated in 6 tests and no lightning fires were caused by storms in the entire area. The total cost was $6850. It is estimated, on the basis of the number of fires started by lightning in adjacent areas, that 90 fires were prevented, representing a saving of $18,000 on timber resources and of $41,666 on fire suppression. It is believed that the work could be done more efficiently by treating the storms before they build up to full size. Further use of this method is planned by the California Division of Forestry.

3691. **Cloud seeding experiments [for lightning prevention].** *Forest Fire Report, Division of Forestry,* *California Department of Natural Resources, Sacramento, 1953* [1954] (10–4).

Cf. preceding abstract.

3692. HARRIS, H. K. **Aerial observer versus look-out**. *Fire Control Notes* 15 (2), 1954 (35–41). 6 refs.

Tests were carried out in mountainous forest, using smoke candles, with ground observers, and aerial observers flying at different distances from them. The effect of atmospheric visibility, smoke location, distance between observer and smoke, and direction of illumination were investigated as well as method of observation. At comparable distances the aerial observers were successful in 74% of their observations, ground observers in only 54%. Smoke location was the most important factor affecting both types of observer; success by all observers varied from 27% for the eastern smoke to 97% for the northern smoke. Aerial observers were strikingly more successful in spotting the smokes that were difficult to see. Direction of illumination (angle at the observer between his line of sight to the smoke and his line of sight to the sun) proved to have no significance for the conditions of this study. Next to smoke location, distance was the most important factor affecting visibility of smoke to aerial observers: at 11·5 miles they had the same degree of success as ground observers at 8·5 miles. Factors that remain to be considered are duration and frequency of observations, in which the advantage is clearly with the ground observer.

3693. HARRIS, H. K. **Helicopter use—fire suppression**. *Fire Control Notes* 15 (2), 1954 (7–12).

Notes on the use of a helicopter in a mountainous region of Montana for transport and control during the 1953 fire season, which made it possible to hold 38 fires developing under severe burning conditions in remote areas, to a burned acreage of 90·8.

433. *Salvage and Disposal of Fire-damaged Timber*

See No. 3617.

434. *Revegetation etc. of Burnt Areas*

See Nos. 3521, 3541.

435. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

See also Nos. 3687, 3734, 4422.

3694. **Forest fire losses in Canada 1952.** Forestry Branch, Department of Resources and Development, Ottawa. 1953. pp. 17 + 6 tbls.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See also Nos. 3420, 3781.

3695. DUCHAUFOUR, P. Note sur l'influence de l'incinération sur l'évolution de l'humus. **[The effect of burning on the development of humus.]** *Rev. for. franç.* 6 (5), 1954 (316–9). [F.]

A note on an experiment carried out, under the aegis of the École Nationale des Eaux et Forêts at Nancy, on two sites: (*a*) on sandy soil in the Gironde, (*b*) on an outcrop of gneiss in Hérault. The soils, in each case, were podzols with raw humus, and the vegetation mainly ericaceous. Sample plots in (*a*) were severely burnt in the summer and a great part of the raw humus destroyed; in (*b*) the burn was carried out in autumn and the humus was hardly affected. Comparison was made with unburnt controls and measurements made of total N and mineral N every 3 months. Observation of (*a*) 3 months after burning showed that pH had changed from 5 to 7·4 and the ratio mineral-N/total-N from 0·5 to 3%. Six months later, however, the effects of burning had almost disappeared: pH had fallen to 6·2, and mineral-N/total-N ratio to 0·5%; moreover the total N had diminished by ca. 50%. The effects on (*b*) of the much milder burn were much more moderate; after 2 months pH had changed from 4·6 to 5·8 and the mineral-N/total-N ratio from 0·6 to 1·5%; 6 months later the pH had fallen to 5 and the mineral-N/total-N ratio to 1·4%. The conclusions drawn are that fire is an instrument to be used with great care, and that it is of the first importance to sow immediately after burning, so as to reap the benefit of increased soil activity and prevent leaching. The sowing of a green manuring crop is probably advisable. It is also important that only the superficial layers of the raw humus should be burnt.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 3498–3501, 3673.

3696. **Proceedings [of the] Lake States forestry clinic on using chemical controls in forest management**. *Misc. Rep. Lake St. For. Exp. Sta.* No. 21, 1953. pp. 68. 50 refs.

A symposium on chemical control of woody weeds.

3697. RÖHRIG, E. Unkrautbekämpfung mit chemischen Mitteln in der Forstwirtschaft. **[Chemical weed control in forestry.]** *Forstarchiv* 24 (6), 1953 (141–47). 158 refs. [G.g.]

A review of European and American literature.

3698. RÖHRIG, E. Erfolgreiche Versuche mit Wuchsstoffmitteln zur Bekämpfung lebender Unkrautdecken im Walde. **[Successful trials of growth regulators for controlling weed growth in the forest.]** *Forstarchiv* 25 (1), 1954 (5–9). 4 refs. [G.g.] [Institut für Waldbautechnik der Univ. Göttingen.]

Reports on trials made in 1952, with an additional check of the kill by mid-May 1953, of several German proprietary herbicides (Tormona, Tormona 80, Tributon, U 46 Spezial) based on esters of the phenoxyacetic acids [not further specified, but cf. *For. Abstr.* 14 (No. 2363)] hand-sprayed as 0·2–0·9% aqueous solutions at various dates between 30 March and 17 Aug. to (1) *Vaccinium myrtillus*, (2) *Calluna vulgaris* and (3) dense, mixed woody and non-woody weed growth on a heavy loess soil. All preparations at concentrations between 0·25 and

0·6% gave 90–100% kills of (1), the best period for spraying being from 15 May to 1 Aug. The highest concentration used (0·9%) gave only a 60% kill of (2), the best spraying period being 15 June–1 Aug. The optimum quantity of water was determined as 800–1000 litres/ha. for (1), and is recommended also for (2). The vegetation in (3) was so uneven as regards composition, height and density that only a few rather general inferences were possible, though it is clear that this too can be successfully controlled by the same means. *Sambucus nigra*, *S. racemosa* and *Rubus idaeus* were almost all killed and it would be very easy to re-treat the few survivors. *Rubus fruticosus* died only slowly and after careful spraying, but could be destroyed by a second spraying. *Sorbus aucuparia* and *Rhamnus frangula* were killed only by careful spraying and rather high dosages of herbicide; most of them were merely defoliated and flushed again later. All of the dicotyledonous herbs present were killed except where sheltered from the spray by higher woody growth. Some general notes are appended on damage to forest tree species, which, it is emphasized, varies greatly with species concerned, stage of seasonal development, dosage, weather and age. Broadly speaking susceptibility to damage decreases in the order Larch, Pine, Spruce for the conifers, and among the hardwoods Birch and Oak were more susceptible than Hornbeam or Beech. Costs of treatment may vary much with locality, especially with the probable need in many cases to transport the necessary water. They are, however, very low compared with those of treatment with e.g. $NaClO_3$ or Na trichloracetate.

3699. Staël von Holstein, J. Erfarenheter av utförd buskbekämpning med hormonpreparat. **[Experience in the use of growth regulators in brush control.]** *Årsb. svenska Flottledsförb.* No. 27, 1953 (1954), (5104–6). [Sw.]

Gives brief particulars of costs, area treated, chemical and concentration for spraying from amphibious tank, plane, and helicopter, and on foot.

3700. Garese, P., and Mársico, O. J. Los herbicidas en la lucha contra el vinal. **[Herbicides in the control of Vinal.]** *Idia* No. 69, 1953 (7–12). [Span.] C.G.B.

Trials in the chemical control of *Prosopis ruscifolia* were carried out in the Añatuya Forest Nursery, Santiago del Estero. The most effective control of large trees was obtained by cutting and treating with a mixture of 10% (acid equivalent) 2,4-D and 10% (a.e.) 2,4,5-T in water or kerosene. The same concentration of the mixture was effective as a basal spray on trees up to 10 cm. diam., with water as a carrier, and on trees up to 15 cm. diam. with kerosene as a carrier. Sprays of a mixture of 25% (a.e.) 2,4-D and 25% (a.e.) 2,4,5-T were fairly successful on trees or coppice growth up to 2 m. in height. A mixture of 2,4-D and 2,4,5-T with 20% kerosene or petroleum distillate (Shell 20) is highly effective and quick working (4 months) whereas the same concentrations in only 10% kerosene or Shell 20 are equally effective but slower. The last two formulations may also be used on *Opuntia* spp., *Geoffraea decorticans*, *Cercidium australe*, *Atriplex* sp. and *Mimosa detinens*.

3701. Rennerfelt, E. Hormonderivatens inverkan på markens mikroflora. **[The effect of growth-regulator derivatives on the soil microflora.]** *Skogen* 41 (12), 1954 (206–7). 3 refs. [Sw.]

Previous European literature on the effect of 2,4-D on the soil microflora is reviewed and results of some laboratory experiments on its effect on fungi are tabulated. These show that bacteria and fungi are not affected by concentrations of about 0·005–0·01% 2,4-D, and there is no danger of damage to the microflora at the concentrations used for spraying hardwood scrub.

3702. Little, S., and Somes, H. A. **Effect of ammate on unwanted growth in Oak/Yellow Poplar stands in New Jersey.** *For. Res. Notes Ntheast. For. Exp. Sta.* No. 29, 1954. pp. 2.

An experiment in treating stumps of unwanted broadleaved trees and shrubs with Ammate crystals proved fairly successful but expensive, costs being estimated at ca. $20·00/acre.

3703. Vaněk, J. Vliv třtiny křovištní (*Calamagrostis epigeios*) na stav a regenerační schopnosti borových sazenic. **[Influence of *C. epigeios* on the condition of young Pine plants and their capacity for shoot regeneration.]** *Lesn. Práce* 32 (11), 1953 (510–4). [Cz.]

Observations on 5000 *Pinus sylvestris* in a young plantation have shown that the number of plants damaged by browsing is almost the same with or without the *C. epigeios*, but the damage is more serious with *C. epigeios* than without it. The soil at depths of 10, 20 and 30 cm. was moister on weeded than on unweeded plots. Different methods of eradicating this grass are described.

442. *Parasitic (Higher) Plants. Climbers and Epiphytes*

3704. Thomas, R. W. **Dwarf mistletoe [*Arceuthobium pusillum*] on Spruce [in Manitoba and Saskatchewan].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (1), 1954 (3).

There is a notable difference in the appearance of brooms formed by this mistletoe on Black and White Spruce. On Black Spruce the growth of twigs in brooms is slower than that of normal twigs; on White Spruce the opposite occurs. Brooms of the former type are dense and dark, those of the latter loose and light and often of greater diameter than normal branches. [Cf. *For. Abstr.* 15 (No. 1484).]

3705. Bourchier, R. J. ***Septogloeum gillii* on Lodgepole Pine mistletoe.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (2), 1954 (3).

Arceuthobium americanum in Alberta has been found to be infected with a fungus causing anthracnose, which has been identified as *Septogloeum gillii*. The significance of this fungus as a natural biological control agent for *A. americanum* is being examined.

3706. Bourchier, R. J. **Chemical control of dwarf mistletoe [*Arceuthobium americanum*] on**

Lodgepole Pine in Alberta. *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (1), 1954 (4).

Tests have been made with aqueous sprays of 5 chemicals. Preliminary results showed that MCP5, 2,4-D ester, and 2,4-D amine caused the mistletoe to wither, but also injured the host. Chlorax [constituents not specified] did no harm to the mistletoe, but browned the Pine foliage. MCP3 caused the parasite to wither rapidly with no apparent injury to the host; further tests will be made. [Cf. *For. Abstr.* 15 (Nos. 400, 1487).]

3707. Gill, L. S., and Hawksworth, F. G. **Dwarf mistletoe [*Arceuthobium vaginatum*] control in Southwestern Ponderosa Pine forests under management.** *J. For.* 52 (5), 1954 (347–53). 6 refs.

Interim recommendations are to cut out the infected trees from uneven-aged stands at harvesting and to follow this up with one or more control cuttings in the residual stand 5 and 10 years later. Pruning is only justified if done for economic or silvicultural reasons. Only those seedlings within 60 ft. of an infected tree are endangered and lateral spread in regeneration is slow. Control in this can be left until cultural operations are due ca. 10 years after the removal of the overwood. [Cf. *For. Abstr.* 15 (No. 400).]

3708. **[Mistletoe on Teak in Trinidad.]** *Rep. For. Dep. Trin. Tob. 1952*, 1954 (10).

Many species of Loranthaceae occur, but only two are serious parasites of Teak. The parasite is cut out from young Teak plantations during the leafless period and at the same time all infested trees are cut in a ½-mile strip all round the Teak, in the surrounding forest. The attack appears to be most severe on poor soils.

443. *Fungi and Bacteria*

See also Nos. 3673, 4428, 4432–3.

3709. **[The dithiocarbamate fungicides.]** *Rep. Sci. Serv. Dep. Agric. Can. 1952/53*, 1953 (33).

Nabam, despite its many good qualities, has been largely replaced by its Zn salt, zineb, because of erratic field performance as a protective fungicide. The activity of nabam has been traced to ethylene thiuram monosulphide which is formed, with S and polymerized material, in the nabam spray residue. The amount of the monosulphide formed varies with environmental conditions, a feature which is one cause of the variable results obtained in practice with nabam. Preliminary plant tests indicate that ethylene thiuram monosulphide is an excellent protective fungicide and may have attributes lacking in materials at present available.

Thiram, employed as a seed and soil fungicide, exhibits a pronounced selective activity against various members of the soil microflora. Its prolonged effectiveness, despite its more or less rapid disappearance from the soil, may be derived from an enhancement of the antibiotic activity of the soil resulting from a changed microflora as well as from direct initial fungicidal activity.

3710. Zobrist, L., and Holenstein, R. Forstlicher Pflanzenschutz. **[Forest protection.]** *Schweiz. Z. Forstw.* 105 (5/6), 1954 (266–76 + 2 plates).

Includes two tables giving for the principal forest species (Beech, Oak, Spruce, Silver Fir, Larch) (*a*) diseases and (*b*) insect pests, under the heads: symptoms, fungus or insect, type of damage, season, and control methods.

3711. Hennig, R. Die tierischen und pflanzlichen Schädlinge unserer wichtigsten fremdländischen Holzarten. **[Animal and plant pests of our most important exotic species.]** *Z. Pflkrankh.* 61 (5), 1954 (255–69). 91 refs. [G.g.e.] E.M.B.

Mainly a review of German literature. The species discussed are: *Tsuga canadensis* and *T. heterophylla*, *Pseudotsuga taxifolia*, *Abies grandis*, *Picea sitchensis*, *Pinus strobus*, *P. contorta*, *P. nigra*, *Larix leptolepis*, *Thuja plicata*, *Castanea sativa*, *Quercus borealis*, *Prunus serotina* and *Robinia pseudoacacia*.

3712. Francke-Grosmann, H. Feinde und Krankheiten der Sitkafichte auf norddeutschen Standorten. **[Pests and diseases of Sitka Spruce on North German sites.]** *Forst- und Holzw. 9A* (6), 1954 (117–9). [G.]

3713. **Secretariat note on pests and diseases.** *[Paper] Near East Poplar Conference 1954, FAO, Rome* No. *FAO/NEPC/5*, 1954. pp. 7. [E.]

Notes on Poplar pests and diseases generally, with a brief discussion of the probable situation in the Near East. A note on the transmission of Poplar disease from one country to another (*R. Rol, H. van Vloten* and *T. R. Peace*) is annexed.

3714. Brown, J. G., and Scandone, T. G. **A bacterial parasite of Tamarisk.** *Plant Dis. Reptr.* 37 (10), 1953 (524–5). A.P.B.

A bacterial disease affecting *Tamarix pentandra* has been observed in Arizona, New Mexico, and Texas, where this species is a widespread and noxious weed.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

See also Nos. 3488, 3505–6.

3715. Georgescu, C. C., and Petrescu, M. Un parasit al fructelor de ulm: *Gloeosporium ulmicola* Miles. **[*G. ulmicola*, a parasite on Elm [*Ulmus pumila*] seed.]** *Rev. Pădurilor* 69 (3), 1954 (106). [Rum.russ.]

3716. **Fusarium root rot.** *Rep. Pacif. Nthwest For. Range Exp. Sta. 1953*, 1954 (30).

Results of the different soil treatments giving best survival in tests to control a serious *Fusarium* root rot in 1 + 0 Ponderosa Pine are tabulated. Autumn applications gave better results than spring. In autumn the best treatment was sawdust + fertilizer + $Al_2(SO_4)_3$, giving a survival 113% better than the control; in spring, sawdust + NaF + $Al_2(SO_4)_3$, with survival 83% better. There were also differences in root development, the roots of seedlings growing in plots with sawdust being bushier and having a better development of mycorrhizae than those in plots treated with $Al_2(SO_4)_3$ alone.

3717. Torgeson, D. C. **Root rot of Lawson Cypress [*Chamaecyparis lawsoniana*] and other ornamentals caused by *Phytophthora cinnamomi*.**

Contr. Boyce Thompson Inst. 17 (6), 1954 (359–73). 25 refs.

P. cinnamomi was found to be the cause of root rot in *C. lawsoniana*, *Taxus* spp., *Erica carnea* and *Calluna vulgaris* in Oregon nurseries, and 25 out of 47 other plants tested proved to be susceptible. As *P. cinnamomi* may occur in soil to a depth of at least 2·4 ft., fumigation does not seem to be a practicable method of control. [Cf. *For. Abstr.* 13 (No. 2257).]

3718. Torgeson, D. C., Young, R. A., and Milbrath, J. A. ***Phytophthora* root rot diseases of Lawson Cypress and other ornamentals**. *Sta. Bull. Ore. Exp. Sta.* No. 537, 1954. pp. 18. 2 refs.

Cf. *For. Abstr.* 12 (No. 713); 13 (No. 2257).

3719. Georgescu, C. C., and Zaharia, E. Contribuţii la cunoaşterea bolilor de inroşire şi scuturare a acelor de molid şi jenuper, cauzate de specii de *Lophodermium*. **[Needle-cast diseases of Spruce and Juniper caused by *Lophodermium* spp.]** *Rev. Pădurilor* 68 (12), 1953 (16–9). 5 refs. [Rum. rum.russ.]

Describes (1) a disease of 3- to 4-year-old Spruce characterized by reddening and fall of the needles, and (2) a disease of Juniper growing under Pine and Oak, with similar symptoms. The pathogens in (1) were found to be *L. abietis* and *L. macrospermum* and in (2) *L. juniperinum*.

3720. Georgescu, C., and Gaşmet, V. Un atac de *Rosellinia byssiseda* (Tode) Schroet. la puieţii de molid. **[An infestation of young Spruce by *Rosellinia byssiseda*.]** *Rev. Pădurilor* 68 (4), 1953 (31–4). 6 refs. [Rum.rum.russ.]

The attack occurred on 3-year-old Spruce that had not been moved from the nursery beds and had drifted snow lodged in their crowns. The whole crown was covered by mycelium. Thinning at 2 years is recommended as a preventive measure.

3721. Henry, B. W. **New light on spread of brown spot**. *Sth. For. Notes Sth. For. Exp. Sta.* No. 90, 1954 (1).

Ascospores of *Scirrhia acicola* have recently been found to occur at all seasons of the year and on live as well as dead needles of *Pinus palustris*, thus disproving the common belief that they are produced only in late winter and early spring and occur only on dead or nearly dead needles.

3722. Moriondo, F. Ricerche sulla *Melampsora pinitorqua* Rostr. in Italia. 1. Comportamento dei semenzali di *Pinus pinea* alle infezioni di *M. pinitorqua*. **[Studies on *M. pinitorqua* in Italy. 1. Reactions of *P. pinea* seedlings to *M. pinitorqua* infections.]** *Ann. Sper. agr.* (*n.s.*) 8 (2), 1954 (593–611 + 2 plates). 17 refs. [It.it.e.] C.G.B.

Describes a study of the regeneration of tissue in the stems of *P. pinea* seedlings damaged by *M. pinitorqua* attack. Regeneration takes place provided that the plant succeeds in arresting the spread of mycelium by a barrier of cork while at the same time maintaining communication between the meristem and the root system. Regeneration begins next to the living phloem and wood and its direction is basipetal.

3723. Moriondo, F. Un pericolo per il pino: la vicinanza del pioppo. **[A danger to Pine: the vicinity of Poplar.]** *Monti e Boschi* 5 (4), 1954 (169–72). [It.f.e.]

Describes damage to young *Pinus pinea* at Orbetello by the rust *Melampsora pinitorqua* whose alternate host is Poplar [cf. *For. Abstr.* 13 (Nos. 1342, 3092)], with some account of measures taken to eradicate Poplar.

3724. Rennerfelt, E. Biologische Untersuchungen über den Kieferndreher *Melampsora pinitorqua* (Braun) Rostr. **[Biological research on *M. pinitorqua*.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 24 (No. 1/3), 1953. pp. 5. 3 refs. [G.] Limited distribution.

There are signs that the incidence of *M. pinitorqua* is increasing in Sweden; this is attributed partly to increased cutting of Aspen for firewood, with consequent suckering, partly to the increase in clear felling and replanting of large areas with Pine, and possibly also to changes in climate. Control by spraying young Pines and by chemical or mechanical eradication of Aspen suckers is discussed briefly. Research has shown that some clones of Pine are very much more resistant to the rust than others, and that while in laboratory tests aeciospores developed on the leaves of *Populus alba*, *P. tremula* and *P. tremuloides*, uredospores developed only on *P. tremula*. [Cf. *For. Abstr.* 13 (No. 1342).]

443.3. Diseases of Older Stages

Stem, Butt and Root Rots; Root Diseases

See also Nos. 3617, 3674–6, 3822, 3824, 3875.

3725. Wagener, W. W., and Davidson, R. W. **Heart rots in living trees**. *Bot. Rev.* 20 (2), 1954 (61–134). 345 refs.

A comprehensive review of the subject, with an extensive bibliography.

3726. Francke-Grosmann, H. Über Wurzel- und Stockfäulen der Sitkafichte auf norddeutschen Standorten. **[Root and butt rots of Sitka Spruce on N. German sites.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 24 (No. 2/2), 1953. pp. 5. 9 refs. [G.] Limited distribution.

3727. Kangas, E. Maannousemasienen esiintymisestä metsissämme. **[*Fomes annosus* in Finnish forests.]** *Metsät. Aikak.* 1954 (5), (175–7). [Fi.e.] (*Metsätietoa, Helsinki* 1954 (1).)

3728. Henriksen, H. A., and Jørgensen, E. Rodfordærverangreb i relation til udhugningsgrad: en undersøgelse på eksperimentelt grundlag. **[*Fomes annosus* attack in relation to grade of thinning: an investigation on the basis of experiments.]** *Forstl. Forsøgsv. Danm.* 21 (2), 1953 (215–51). 9 refs. [Dan.e.]

Investigations have been made since 1946 on the degree of attack on thinning plots in 2 stands of Norway Spruce planted in (*a*) 1893 and (*b*) 1907, and one of Sitka Spruce (*c*) planted in 1905–12. An examination of the stumps showed that on plot (*a*) the degree and extent of attack increased with increasing severity of thinning and there was little or no attack where only dead trees had been removed;

the other 2 plots were less severely attacked and results were not so clear. On plots (*a*) and (*c*) mean diameter appeared to be slightly less in diseased than in healthy trees. In standing trees, the presence of the fungus was determined by laboratory culture of increment cores at room temperature for a month. *F. annosus* was the only wood-destroying fungus found in the cultures. The number of trees infected in plot (*a*) increased with increasing severity of thinning while in plot (*b*), (plot (*c*) was not included in this part of the investigation) attack was small and results were inconclusive. Attack was small or non-existent where only dead trees had been removed, and the mean diameter of healthy trees was slightly higher than that of diseased trees. Trunks of diseased trees showed a slight thickening below breast height, but taper of the upper part was similar to that of healthy trees. Height increment of slightly infected trees was similar to that of healthy trees, as was that of heavily infected trees until about 1943 since when it has been ca. 60% of that of the healthy trees. Similar but less clear results were found for diameter increment. The adequacy of investigations based on examination of stumps alone is discussed.

3729. OKSBJERG, O., and WEST-NIELSEN, G. Om rodfordærverangreb. **[Damage [to Spruce] by *Fomes annosus*.]** *Hedeselsk. Tidsskr.* 74 (15), 1953 (319–34). [Dan.] C.G.B.

Replies to a questionnaire on the relationship between *F. annosus* attack and soil cultivation on reclaimed heathland show that attack is most severe on sites intensively cultivated. An investigation was made on a plantation established on heathland in 1874–77 and given various fertilizer treatments in 1921–22, to determine the relationship between attack and fertilizer treatment. The results indicate that attack is favoured by fertilizer treatment and by the removal of brushwood, and is least in the untreated belts between the treated plots where the brushwood from the plots was scattered. A study of a neighbouring area treated with $CaCO_3$ with or without other fertilizer treatment shows that $CaCO_3$ favours *Fomes* attack, but that the relationship is not necessarily connected with the effect of the $CaCO_3$ on the pH of the soil. A possible explanation of the increased attack on plots that have been given heavy treatment with $CaCO_3$ or from which litter has been removed, is the reduced water-holding capacity consequent on a reduction in the humus content of the soil. Results are tabulated. Further work on the effect of N fertilizers on *Fomes* attack is proposed.

3730. DOMAŃSKI, S. Badania nad przyczynami powstawania posuszu w starszych drzewostanach sosnowych w Wielkopolskim Parku Narodowym w Ludwikowie. **[Investigations on the causes of mortality in the Pine stands of the Wielkopolski National Park at Ludwikowo.]** *Prace Inst. Bad. Leśn.* No. 93, 1953. pp. 83. 68 refs. [Pol.russ.e.]

Presents the results of research from 1945 to 1948. The climatic and edaphic features of the area were investigated. The results of systematic examination of 269 dead stems (aerial parts), 155 diseased stems (dug out with roots), and 26 healthy sample trees of *Pinus sylvestris* showed that die-back was caused by *Armillaria mellea* (*a*), *Fomes annosus* (*b*), and *Cronartium asclepiadeum* (*c*), the incidences of these fungi being 50–60, 15–25 and 8–35%, respectively. The great damage caused by (*a*) was facilitated by the fact that the root system of older stems was in 80–90% of cases infected with *Polyporus tomentosus* var. *circinatus*. Some 30–34% of the trees had their crowns attacked in 1944–6 by *Myelophilus piniperda* and *M. minor*, which could facilitate the attack by fungi.

3731. BOURCHIER, R. J. ***Armillaria* rot of natural Lodgepole Pine regeneration in Alberta.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (1), 1954 (4).

About 10% of a post-fire stand, 2–5 ft. high, was found to be dead or dying as a result of *A. mellea* root rot.

3732. BUCKLAND, D. C., MOLNAR, A. C., and WALLIS, G. W. **Yellow laminated root rot of Douglas Fir.** *Canad. J. Bot.* 32 (1), 1954 (69–81 + 19 photos). 12 refs. O.R.S.

The distribution and hosts of 'annual' *Poria weirii* (causing the yellow laminated root rot of Douglas Fir) and of 'perennial' *P. weirii* (causing yellow ring rot of *Thuja plicata* and not found in any other coniferous host) are discussed. Annual *P. weirii* grows from infected to healthy roots through fusions or physiologically weakened contacting points. Douglas Fir is susceptible at any age over 6 years, but there is considerable difference in resistance of individual trees. Inoculum may remain viable for over 50 years in stumps and roots. It does not appear to spread through the soil nor to penetrate healthy bark tissue.

3733. ANDREWS, S. R. **Western red rot of Ponderosa Pine.** *Abstr. of thesis*, in *Dissert. Abstr.* 13 (6), 1953 (940). [University of Minnesota.] O.R.S.

Polyporus anceps causes the most important heart rot in living Ponderosa Pine in Arizona, New Mexico and the Black Hills of S. Dakota but is negligible on this and other coniferous species elsewhere in N. America. Its spread from the initial infection in recently dead branches still covered in bark is described. In virgin stands the loss amounts to 15–20% of the volume and in cut-over stands to 5–10%. Incidence of infection in stands between 41 and 100 years is closely correlated with tree size, stand density and number of dead branches on the lower trunk. The amount of heart rot in young stands is low, but there is a linear increase of ca. 1·5 ft./10 years. Pruning dead branches on young trees arrests or kills the fungus in a significant number of cases [cf. *For. Abstr.* 15 (No. 2512)]. Examination of a large number of fruit bodies showed that *P. ellisianus* is identical with *P. anceps*, the latter being the earlier and preferable name. A number of races or varieties were distinguished in laboratory cultures.

3734. **[Red stain of Lodgepole Pine in Alberta.]** *Rep. Sci. Serv. Dep. Agric. Can. 1952/53*, 1953 (9).

Examination of 133 Lodgepole Pines on five $\frac{1}{10}$-acre plots in 3 different areas showed that 84%

of trees had red stain and decay associated with *Fomes pini*, *Polyporus anceps*, *Stereum pini* and *S. sanguinolentum*. In 46·5% of trees injured by fire, red stain was associated with basal fire scars.

3735. Foster, R. E., Craig, H. M., and Wallis, G. W. **Studies in forest pathology XII. Decay of Western Hemlock in the Upper Columbia region, British Columbia**. *Canad. J. Bot*. 32 (1), 1954 (145–71 + 8 photos). 20 refs. O.R.S.

An investigation of *Tsuga heterophylla* showed that decay losses amount to 52 and 74% of the gross volume/acre in terms of cu. ft. and bd. ft. computations respectively. The logs of 833 trees on 36 sample plots in mature timber were analysed in detail. Twenty-six decay-producing fungi were isolated. Of the total decay 62% was attributed to *Echinodontium tinctorium* and 25% to *Fomes pini*. Stand defect losses varied from 38 to 71%. *E. tinctorium* decreased and *F. pini* increased, in relation to total incidence and importance of decay, with increasing site quality. Sporophores, scars, dead tops, large rotten branches, swollen knots, frost cracks, forked trees and trunk infections of mistletoe were classed as important indicators of hidden defect. Living trees classed as 'suspect' or 'residual' according to the presence or absence respectively of one or more indicators of defect, were found to differ appreciably in average defect. Decay increased progressively with increasing diameter and decreasing site quality. Immature Hemlock was found to be susceptible to appreciable decay, and mature stands reached an advanced stage of deterioration (about 50% defect) at 250 years. Multiple correlation analysis between decay %, site, age, and the relative % of 'residual' trees weighted by volume, permitted an estimate of total stand defect within ± 7%.

3736. Nordin, V. J. **Studies in forest pathology XIII. Decay in Sugar Maple in the Ottawa-Huron and Algoma Extension Forest region of Ontario.** *Canad. J. Bot*. 32 (1), 1954 (221–58 + 17 plates). 44 refs. O.R.S.

Of 606 sample trees 74% had some measure of decay, and 28 fungi were found associated with decay in living trees, the most frequent being *Armillaria mellea, Polyporus glomeratus, Ustulina vulgaris, Fomes connatus, Hydnum septentrionale, Corticium vellereum, Pholiota spectabilis* and *F. igniarius*. *A. mellea* is the most serious butt-rot, and *P. glomeratus* the most serious trunk-rotting species. Frost cracks are the most important places of entry. The average extent of decay in living trees can be estimated by the occurrence of sporophores of *F. connatus*, *F. igniarius*, *H. septentrionale* and *U. vulgaris*. The incidence and volume of decay increased progressively with age and diameter. *From author's summary*.

3737. Stilwell, M. A. **Progress of decay in the crowns of decadent Yellow Birch**. *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can*. 10 (2), 1954 (1).

Examination of 476 trees in Nova Scotia showed that 195 contained decay in branches in the crown. Fungi and frequency of their occurrence as related to crown-injury classes are tabulated. *Fomes fomentarius* was by far the most frequent cause of decay.

3738. Vanin, S. I., Baženov, V. A., and Vihrov, V. E. O vlažnosti zdorovoĭ i poražennoĭ gribami drevesiny v stvolah rastuščih derevjev. [**Moisture content of healthy and fungus-infected wood in stems of growing trees.**] *Trud. Inst. Les*. 9, 1953 (255–60). 2 refs. [Russ.]

Presents tabulated results of the following measurements at 2–3 levels in 5 Aspen stems (50–60 years) infected with *Fomes igniarius* and 5 Oak stems (40–45 years) infected with *Polyporus dryophilus*, *P. sulphureus*, and *F. robustus*: (1) distribution of moisture content (m.c.), and (2) fungal attack (in % of sectional area), showing the % of healthy sapwood, healthy heartwood, and fungus-affected heartwood (3 stages of infection). Aspen wood shows the highest m.c. in the 1st and lowest in the 3rd stage of fungal attack. No increase of m.c. could be observed in decaying Oak wood.

Wilts, Diebacks etc.

3739. Hoffman, P. F. **Oak wilt fungus pathogenic on *Quercus chrysolepis* and *Q. agrifolia*.** *Plant Dis. Reptr*. 37 (10), 1953 (527). A.P.B.

Laboratory experiments proved the susceptibility of these species.

3740. White, I. G. **Physiology of *Endoconidiophora fagacearum*, the fungus causing Oak wilt, with special reference to growth and toxin production in synthetic media**. *Abstr. of thesis*, in *Dissert. Abstr*. 14 (3), 1954 (450–1). [Vanderbilt University.] O.R.S.

3741. Struckmeyer, B. E., Beckman, C. H., Kuntz, J. E., and Riker, A. J. **Plugging of vessels by tyloses and gums in wilting Oaks**. *Phytopathology* 44 (3), 1954 (148–53). 14 refs.

3742. Merek, E. L., and Fergus, C. L. **The effect of temperature and relative humidity on the longevity of spores of the Oak wilt fungus.** *Phytopathology* 44 (2), 1954 (61–4). 13 refs.

Endoconidia and ascospores lived longest under cool, dry conditions.

3743. Griswold, C. L. **Transmission of the Oak wilt fungus by the pomace fly**. *J. econ. Ent*. 46 (6), 1953 (1099–100).

In laboratory experiments a wounded Red Oak seedling died from Oak wilt disease after exposure to adult *Drosophila melanogaster*. The flies had previously fed and laid eggs on sporulating mats of *Endoconidiophora fagacearum*. [Cf. *For. Abstr*. 14 (Nos. 1318, 2396).]

3744. Norris, D. M., Jr. **Insect transmission of Oak wilt in Iowa**. *Plant Dis. Reptr*. 37 (8), 1953 (417–8). 1 ref. (*Journal Paper Iowa Agricultural Experiment Station* No. *J*–2349.) A.P.B.

Species of Nitidulidae were collected from mats and pads of *Endoconidiophora fagacearum* carrying the perithecial stage, and were caged on wounded trees that had been cut off from any possible root infection. The results indicate that as few as two nitidulid beetles can infect a tree through a fresh wound within 3 weeks. [Cf. *For. Abstr*. 15 (Nos. 1522–4).]

3745. Dorsey, C. K., Jewell, F. F., Leach, J. G., and True, R. P. **Experimental transmission of Oak wilt by four species of Nitidulidae.** *Plant Dis. Reptr.* 37 (8), 1953 (419–20). 3 refs. A.P.B.

During 1952, 70 Oak trees were experimentally inoculated through nitidulid or scolytid beetles contaminated with spores of the Oak wilt fungus. The outer bark of the tree was smoothed until a plastic perforated vial containing the insects would fit over it. None of the trees thus inoculated showed Oak wilt symptoms. Similar inoculations were made in 1953 with 4 nitidulid species, but in these cases the inner bark was separated from the sapwood, and some inoculations were made on large blaze-like wounds. Five out of 6 trees inoculated in May displayed Oak wilt symptoms in June. Observations on trees wounded and left uncaged showed that healthy wounded trees are normally visited by adult nitidulids.

3746. Craighead, F. C., Morris, C. L., and Nelson, J. C. **A preliminary note on the susceptibility of wounded Oaks to natural infection by the Oak wilt fungus.** *Plant Dis. Reptr.* 37 (9), 1953 (483–4). 4 refs. A.P.B.

Wounds of various types were made on healthy trees located at least 300 yards from trees producing sporulating mats of *Endoconidiophora fagacearum*. On 2 out of the 3 test areas, wounded trees were later found to be suffering from Oak wilt. Among insects collected from the wounds were larvae of several species of Nitidulidae and Diptera. In the two affected test areas the healthy trees were in the neighbourhood of diseased trees producing mycelial mats bearing fertile perithecia. On the third area the only possible source of inoculum was mats bearing conidiospores.

3747. Boyce, J. S., Jr. **Spraying of Oak wilt trees to reduce infection hazard.** *Res. Note Stheast. For. Exp. Sta.* No. 52, 1954. pp. 2.

Spraying logs from infected trees with a mixture of 1% BHC, 3% DDT and 5% pentachlorophenol in No. 2 fuel oil considerably reduced the number of insects present, and is considered a promising method of reducing spread of the disease by insects.

3748. Went, J. C. **The Dutch Elm disease: summary of fifteen years hybridisation and selection work (1937–1952).** *Tijdschr. PlZiekt.* 60 (2), 1954 (109–27). 41 refs. [E.du.] E.M.B.

Cankers, Stem Rusts etc.

See also Nos. 3430, 3822.

3749. **Fusiform rust of Southern Pines.** *Rep. Sth. For. Exp. Sta. 1953*, 1954 (82–4).

In an open stand, 161 rust-killed Slash Pines, average age 15 years and d.b.h. 5·8 in., were dissected. The average % of stem circumference covered by the canker at the time of death was 75, lethal cankers averaged 7 years old and 86% were on the lower 16 ft. of stem. In a dense stand, 10 to 25 years old, 99 rust-killed trees showed that lethal cankers involved 80% of the stem circumference and that 96% were on the lower 16 ft. A study of Slash and Loblolly Pines at 3 places in S. Mississippi showed that Loblolly is rather more susceptible to rust, but that a higher % of Loblolly infections are limited to branches. Research at the Harrison Experimental Forest, Saucier, Mississippi, showed that on cut-over sites rust incidence in planted Slash Pine increased fairly steadily from 29% at 4·6 × 4·6 ft. spacing to 41% at 9·3 × 9·3 ft., while on old-field sites the figures were 36% and 58% respectively. The incidence of stem cankers also increased with wider spacing, figures being 64% at 4·6 × 4·6 ft., 69% at 5·4 × 5·4 ft., 72% at 6·6 × 6·6 ft. and 81% at 9·3 × 9·3 ft. Research on 1 + 0 Slash Pine seedlings at the Harrison Experimental Forest showed that the presence of basal branches does not of itself indicate infection and that only those seedlings with pronounced globular and fusiform swellings on the lower stem should be culled.

3750. Strong, F. C. **Spruce branch canker.** *Proc. 29th nat. Shade Tree Conf. 1953*, 1954 (30–5).

An account of the symptoms and control of *Cytospora kunzei* canker of *Picea pungens* [cf. *For. Abstr.* 12 (No. 1574)].

3751. Manners, J. G. **Studies on Larch canker. I. The taxonomy and biology of *Trichoscyphella willkommii* (Hart.) Nannf. and related species.** *Trans. Brit. Mycol. Soc.* 36 (4), 1953 (362–74 + 1 plate). 29 refs. O.B.D.

[Cf. *For. Abstr.* 5 (199).] *T. willkommii* is accepted as the name of the parasite and the new combination, *T. hahniana* (Seaver) Manners is proposed for the related saprophyte usually known as *Dasyscypha calycina*. The 2 species are distinct both morphologically and pathologically. Inoculation experiments in a frost-free locality indicated that *T. willkommii*, but not *T. hahniana*, could cause cankers and die-back on European Larch when inoculated into wounds. *From author's summary.*

3752. Beattie, R. K., and Diller, J. D. **Fifty years of Chestnut blight in America.** *J. For.* 52 (5), 1954 (323–9). 22 refs.

Traces, from its beginning in 1904, the extermination of the indigenous Chestnut in the U.S.A. by *Endothia parasitica* introduced from E. Asia. Resistant Chestnuts from the endemic area (China and Japan), crossed with an American and backcrossed to an oriental parent, produce resistant forms. In 11 eastern states 13 test-plots generally replicating 50 each of Clapper's and Graves' hybrids and 50 of the Chinese P.1.58602 should produce within a decade supplies of seed for the re-establishment of a Chestnut that will give a decay-resistant timber, tannic acid, and nuts. Already some of these hybrids are showing blight resistance, vigour, form, and winter- and drought-hardiness superior to the P.1.58602.

3753. Biraghi, A. **Possible active resistance to *Endothia parasitica* in *Castanea crenata*.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 24 (No. 1/1), 1953. pp. 2. [E.] Limited distribution.

An example of resistance to the disease in Chestnut coppice [see *For. Abstr.* 13 (No. 3991)] is discussed. Other examples of resistance have since been found. The reaction of different species of Chestnut to the pathogen is considered and it is suggested that some of the species may contain a character for resistance, only released by severe and repeated infections by the pathogen.

3754. Bagchee, K. **New and noteworthy diseases of trees in India: pit canker of Siris (*Albizzia procera* Benth.) due to *Fusarium solani* (Mart.) App. et Wr. *sensu* Snyder et Hansen.** *Indian For.* 80 (5), 1954 (246–51 + 3 plates). 10 refs.

Trees 15–20 years old are attacked by the pathogen, causing bark and stem cankers that may be as much as 10 ft. long and extend to ¾ of the girth of the tree. The disease has been studied for the last 15 years at Dehra Dun and the results of these observations are described.

3755. Sabet, K. A. **Studies in the bacterial die-back and canker disease of Poplar. II. The relation between the bacterial slime and the causal organism.** *Proceedings of the Society for Applied Bacteriology, Reading* 16 (1), 1953 (45–55). 8 refs. L.S.

An attempt was made in these investigations to discover why the production of typical symptoms by the bacteria depends on the presence of natural slime or of sterile slime filtrate. It was discovered that the bacteria in the slime are capsulated and withstand drying longer than the non-capsulated form derived from cultures. The natural slime is either neutral or slightly alkaline, but turns acid when kept under humid conditions. It contains available nutrients, a toxic substance and two pectic enzymes. Glutamine and asparagine, both of which belong to the classes of compound detected in natural slime, increase considerably the infectivity of the bacteria. Cultures of the pathogen 10 weeks old contained a wilt-producing toxin that also apparently increased infectivity. Infectivity dropped rather sharply when the bacteria were suspended in acid solutions. Typical cankers were not produced by adding nutrients to bacteria inoculated into Poplar twigs. The slime provides a particularly suitable substrate possessing the optimum requirements for infection. [Cf. *For. Abstr.* 14 (No. 2406).] *From author's summary.*

3756. Sabet, K. A. **Studies in the bacterial die-back and canker disease of Poplar. III. Freezing in relation to the disease.** *Ann. appl. Biol.* 40 (4), 1953 (645–50). 9 refs. O.R.E.

Artificial freezing of Poplar cuttings caused serious necrosis of leaves. Branches were either killed outright or showed only slight internal damage. No cracks or cankers were formed on living branches. In the early stages freezing may inhibit infection. It is concluded therefore that frost is not essential for the establishment of the disease, though it may increase the damage caused by a well established infection. [Cf. *For. Abstr.* 14 (No. 2406).]

3757. Stuart, B. E. St. L. **Poplar canker and frost.** *J. Oxf. Univ. For. Soc.* (*Ser. 4*) No. 2, 1954 (13–7).

Rooted cuttings frozen at temperatures of 31°, 28° and 25° F. showed a correlation between damage and stage of flushing, and indicated that susceptibility to frost injury sets in about two weeks before the buds flush. No relation was found between susceptibility to frost damage and the incidence of canker. Old cankers became active by mid-February, but new swellings did not appear till the end of March. From the old cankers fungi and yeasts were obtained, but from the new swellings other yeasts and bacteria, which were always found together. The yeasts were found particularly in the slime clots and the bacteria in the water-soaked areas round them. It is suggested that bacteria become active either when wood starts to form or when some injury is done to it. Late frost is suggested as a possible cause of injury. *Author's summary.*

3758. Peace, T. R. **The testing of Poplars for their reaction to disease.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 24 (No. 1/2), 1953. pp. 8. 6 refs. [E.] Limited distribution.

Discusses briefly trials in progress or proposed on resistance by varieties and clones to frost damage, wind damage, *Dothichiza* canker and die-back, and *Melampsora* rust and, in more detail, experimental inoculations with *Pseudomonas syringae* f. *populae* and planting young trees where they are exposed to heavy natural infections.

3759. Schmidle, A. Zur Kenntnis der Biologie und der Pathogenität von *Dothichiza populea* Sacc. et Briard, dem Erreger eines Rindenbrandes der Pappel. **[The biology and pathogenicity of *D. populea*, the cause of a bark-scorch of Poplar.]** *Phytopath. Z.* 21 (2), 1953 (189–209). 52 refs. [G.g.] [Institut für forstliche Mykologie und Holzschutz, Hann. Münden.] O.R.S.

The nature and development of the disease are described. Inoculations with spores and mycelia of the fungus were made on young plants, growing strongly in the open, recently transplanted, artificially weakened by cutting or constricting the branches and twigs, or cut back to a 30-cm. stump. Inoculation by spores on the plants growing normally gave successful infections of not more than 10% from April to July, with higher figures for the rest of the year reaching a maximum of 38·5% in October. Similar results were obtained for inoculation by mycelium, with a maximum of 64% in October. Inoculation with spores in April on freshly transplanted material gave only 7 successful infections from 116 plants, but inoculations with mycelium gave 80% successful infection. Damaged areas caused by artificial inoculation were 2 to 8 cm. long. Only very slight damage was caused by spore inoculations on stumps or artificially weakened plants, but both of these were severely attacked by *Cytospora chrysosperma.* Infection probably enters naturally through wounds and leaf scars. *Populus deltoides* with 89% and *P. robusta* with 37% successful infection appeared least resistant to attack, while *P. canescens* was only very slightly attacked. [Cf. *For. Abstr.* 15 (No. 2643).]

3760. Roth, E. R., and Hepting, G. H. **Eradication and thinning tests for *Nectria* and *Strumella* canker control [in mixed Oak stands] in Maryland.** *J. For.* 52 (4), 1954 (253–6).

Over a 16-year period, thinning failed to increase the rate of healing of *Nectria* and *Strumella* cankers on Oak. Attempts to prevent further cankering by removal of infected trees over an 18-year period proved unnecessary for *Nectria* and ineffective against *Strumella*.

Foliage Diseases

See also No. 3446.

3761. MORRIS, C. L. **Chemical control of *Hypoderma lethale* on Pitch Pine**. *Plant Dis. Reptr*. 37 (6), 1953 (368–70). A.P.B.

Puratized Agricultural Spray at a rate of 1 pint or 2 pints/100 gal. water or a fixed Cu spray at a rate of 16 lb./100 gal. water gave excellent control when applied at 2-week intervals throughout the growing season. Heaviest infection takes place during the middle two weeks of June and good control of the fungus may be obtained by a few applications during this period, particularly with the Puratized Agricultural Spray.

3762. HVASS, J. Douglasgran och sodskimmel. **[Douglas Fir and the Swiss leaf-cast disease.]** *Dansk Skovforen. Tidsskr*. 37 (3), 1952 (97–107). [Dan.]

Deals with observations in the Buderupholm forest district, Denmark. Seed from a single parent was divided into two 500-g. lots, broadcast (*a*) in Nov. 1948 and (*b*) in late April 1949, in nursery beds: (*a*) produced 27% more plants, and these were twice as high in Dec. 1949 as those in (*b*). When planted out in autumn 1951 the mean heights of the 25 largest plants of each lot were respectively 80 and 49 cm. Where ground vegetation is not too heavy, natural regeneration occurs and wildings transplant well if dug up in a rainy period and put out under light shelterwood. Several thousand wildings, up to 1½ m. high, have been used, and losses have generally been below 5%. As regards attack by *Phaeocryptopus gaeumannii*, the least susceptible have been plants from local seed and, so far as the very limited experience goes, those from seed from the Olympic National Forest, Washington. Observations suggest that shade and humid air favour the fungus. Planting sites should therefore be open, pure plantations are better avoided, and green pruning and early, heavy thinning are to be recommended.

3763. LUNDBERG, J. 1947-skadernes indvirkning på douglasgranens tilvækst. **[Effects of injuries [by frost and *Phaeocryptopus gaeumannii*] in 1947 upon the increment of Douglas Fir.]** *Dansk Skovforen. Tidsskr*. 37 (9), 1952 (467–72). [Dan.] [Statens forstlige Forsøgsvæsen.]

The year 1947 saw widespread damage to Douglas Fir in Denmark, many stands—especially young ones—being more or less completely defoliated by a combination of severe winter frost and attack by *Phaeocryptopus gaeumannii*. Since then, many stands have shown rapid recovery and look fairly healthy, but to verify effects upon increment a study was made in 1951 of plots of 4 provenances, aged 21–22 years, in the Nødebo district. Routine measurements had been kept, and 30 trees were taken (from thinnings, but as nearly as possible representative of the residual stand) for stem analyses. The provenances were: (1) Lerchenborg, Denmark ('green' type; ultimate origin unknown); (2) Pacific County [Washington], near Raymond ('green' type); (3) Spirit Lake (Long Bell), ca. 120 km. SE. of (2) ('green' type); and (4) Lauterbach, Hesse (unknown origin; intermediate 'grey-green' type). Damage in 1947 had been in the increasing order (1), (2) and (3 + 4). Results, which are shown in graphs, indicate that by 1949–50 the best recovery in volume c.a.i. was made by (2) and (1) followed by (3) and (4), in that order. None attained the growth that should have been expected if the curves had continued normally. The fungus is still abundant in all the plots, causing about the degree of leaf-cast that would be expected in the normal course of the disease. The question of provenance and *Phaeocryptopus* attack is to be dealt with more fully in a later paper.

3764. MEYER, H. Rhabdoclinebefall an Douglasien verschiedener Provenienz. **[Attack of *Rhabdocline pseudotsugae* on Douglas Fir of different provenance.]** *Forst- u. Holzw*. 9*A* (9), 1954 (180–2). [G.]

Trial plots were established in 1932 with Douglas Fir seed of 13 different provenances to test for resistance to *R. pseudotsugae*. All trees of var. *viridis*, of whatever provenance, proved completely resistant. Trees of the *glauca* variety were all exceedingly susceptible. Trees of the *caesia* variety showed different degrees of susceptibility according to their provenance; those from higher altitudes (1000 m.) in British Columbia were completely resistant; those from the more easterly regions of B.C. were highly susceptible.

3765. NISIKADO, Y., and WATANABE, K. **The large leaf-spot of Chestnut**. *Ber. Ohara Inst*. 10 (1), 1953 (9–16). 15 refs. [E.e.]

The causal fungus (*Monochaetia desmazierii*) was isolated. Its characteristics in culture are described.

3766. PLAKIDAS, A. G. **Spot anthracnose of Chinese Holly**. *Mycologia* 46 (3), 1954 (346–53). 2 refs. P.R.

Describes spot anthracnose, a new disease of *Ilex cornuta*, characterized by lesions on leaves, stems and berries. The causal fungus is described as a new species under the name *Elsinoë ilicis*.

444. *Virus Diseases*

3767. SORAUER, P. [Re-edited by KÖHLER, E., and KLINKOWSKI, M.] Handbuch der Pflanzenkrankheiten. Band II. Die Virus- und Bakterienkrankheiten. 1. Lieferung. Viruskrankheiten. **[Manual of plant pathology. Vol. II. Virus and bacterial diseases. No. 1. Virus diseases.]** Paul Parey, Berlin & Hamburg. 6th ed. (rev.) 1954. pp. xvi + 770. Many refs. [G.] Price [£13. 3*s*. 0*d*.]

Cf. *For. Abstr*. 15 (No. 1559).

45. DAMAGE BY ANIMALS

451. *Mammals*

See also Nos. 3232, 3519, 3703, 3711

3768. KESSL, J., *et al.* Ochranné prostředky proti škodám působeným zvěří a drobnými hlodavci na lesních kulturach. Část prvá: Prostředky přímé. (Rozsochy, ochrana mechanická, chemická). **[Protective measures against damage caused by deer and small rodents in forest plantations. Pt. 1: Direct measures. (Plant screens, mechanical and chemical protection.)]** *Za social. Zeměd.* 4 (1), 1954 (39–55). [Cz.] C.G.B.

Discusses 'direct' measures, i.e. either (1) denying the animals access to plants, or (2) rendering the plants imperceptible to the animals' sense organs, or (3) repelling, completely or partly, the browsing animals by unpleasant taste etc. Describes the use, mostly in Czechoslovakia, of screening plants (natural or introduced), Spruce branches stuck into the soil round the plant, dried-twig screens, fences of different design, wrappings (paper tape, rushes, reeds, straw, bark etc.), covering layers (brushwood, thorny branches, perennial herbs, e.g. *Epilobium angustifolium* from clearings), different sprays, and liquids for brushing on. Besides these methods, applicable to plantations before closure, others used for protecting older stands (felling of stems for browsing, titbits for animals, covering, sprays etc.), for preventing the animals from burrowing for seeds (live cover plants, glass wool etc.), and for the control of mice (poisons and bacterial diseases) are discussed. A number of methods quoted are only in the research stage. Some 50 tree, shrub and plant species are listed as suitable for screen and cover plants.

3769. FRANK, F. Die Entwicklung der Mäuseplage im Winter 1952/53. **[The development of the vole outbreak in the winter of 1952–53.]** *Forstarchiv* 24 (8), 1953 (198–9). [G.]

[Cf. *For. Abstr.* 15 (Nos. 432–3).] In the southern regions of N.W. Germany (Westphalia, Weserbergland, Harz), damage by *Microtus agrestis* has been unexpectedly light and local. Towards the coast, however, especially in Schleswig-Holstein, it has been very severe, involving in some cases the complete destruction of plantation areas exceeding 10 ha. Beech has been the most heavily attacked, along with Hornbeam, Maple, Ash and Oak; conifers have been almost untouched. Attacks have been made not only on young plantations, but also on Beech up to more than 10 cm. and Hornbeam of more than 20 cm. diameter, and in Schleswig-Holstein on natural regeneration under opened canopy as well. In some instances damage by other species, e.g. especially *Arvicola terrestris* has also occurred—but without the marked regional difference in attack. The low incidence of damage in the south is attributed to a wet autumn followed by an early winter with considerable snowfalls; this seems to have provided alternative food by protecting the abundant grass from frost. In the northern, coastal areas, the grass was killed off early, since no considerable snow fell until December; hence the severity of attack on the trees. The spring of 1953 appears to show a collapse of the outbreak and the next 'plague' year is likely to be 1955, so far as deductions can be made as to periodicity. Most of the control experiments (all in the south) were upset by the failure of large-scale attack and few inferences are possible. Poison baiting and chemical repellents [none specified by name] do not seem to have been effective in most cases.

3770. TANAKA, R., and UDAGAWA, T. **[Studies on the control of field mice (III). Field studies on the reduction of *Microtus* population exposed to poison baits.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 67, 1954 (81–92). 21 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 15 (Nos. 434–5).] Results of experiments using corn treated with $CH_2FCOONa$ as bait suggested that most of the population had been killed. The mice were less suspicious of bait than of traps, and the method is therefore more promising for this species, which is comparatively difficult to trap. Poisoning should be repeated at intervals of 1–2 months during the period of damage. Suitable amounts of poison bait to be used within a unit area and the distribution of the bait in afforested areas were determined. *From authors' summary.*

3771. UDAGAWA, T. **[*Rattus norvegicus* does harm to the woods.]** *J. Jap. For. Soc.* 36 (4), 1954 (92–5). 9 refs. [Jap.jap.e.]

Two-year-old *Chamaecyparis obtusa* planted on 8 ha. of the Kiso National Forest, Nagano Prefecture, in 1951 was almost destroyed by rodents by the spring of 1953. Trapping and poisoning in the area showed that the population of *R. norvegicus* was high. Bite marks on the bark 10–20 cm. above the ground on 15-year *Tsuga sieboldii*, 10-year *Abies firma* and 20-year *Pinus pentaphylla* were too large for *Apodemus*, and it is concluded that *R. norvegicus* must be considered as a threat to forest plantations. *From author's summary.*

3772. UDAGAWA, T. **[Behaviour of the Formosan squirrel on Izu Oshima island and some methods of extermination.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 67, 1954 (93–102). 8 refs. [Jap.jap.e.]

Squirrels of the subspecies *Callosciurus erythraeus thaiwanensis* and *C. e. centralis*, escaped from the Zoo since 1935, have spread over the island and are doing considerable damage to *Camellia*, reducing the oil yield. Breeding, distribution and periods of activity are discussed. Poisoning with 0·5 mg. $CH_2FCOONa$, 500 mg. $BaCO_3$ or 6 mg. P is effective. *From author's summary.*

3773. UDAGAWA, T. **[Damage to forests by the giant flying squirrel and a new method of extermination.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (133–44). 10 refs. [Jap.jap.e.]

Extensive damage has been caused by bark stripping by *Petaurista leucogenys* to deciduous trees and conifers mainly between 20 and 40 years old. An automatic trap (illustrated), to be hung 3–5 m. above the ground, has been devised. *From author's summary.*

3774. COTTERELL, SIR R. **Grey squirrel destruction.** *Quart. J. For.* 48 (2), 1954 (104–8 + 7 photos).

Describes shooting and trapping methods, with emphasis on the second, and describes several types of trap.

3775. **Traps for grey squirrels.** Forestry Commission, London. 1954. pp. 9.

Gives details and plans of the Legg cage trap and the Wells cage trap, as well as some notes on tunnel trapping.

3776. **Myxomatosis: report of the advisory committee on myxomatosis.** H.M. Stationery Office London. 1954. pp. 12 + map. Price 9*d*.

3777. Müller, W. Ist Calciumcarbid-Schlamm ein Wildverbissschutzmittel? **[Is CaC_2 paste a repellent against damage by animals?]** *NachrBl. dtsch. PflSchDienst*. 8 (5), 1954 (97). [G.]

Trees at the Institut fur Acker- und Pflanzenbau, Müncheberg, treated with CaC_2 paste and waterglass were singled out for attack by rabbits and hares. It is suggested that a lack of Ca in the soil of this region may cause this preference.

3778. Wempe. Schutz gegen Wildschaden auf reinen Nadelholzkulturen. **[Protection against deer damage in pure conifer stands.]** *Forst- u. Holzw. 9A* (11), 1954 (233–5). [G.]

Discusses the relative merits and costs of fencing and of chemical repellents. In thrifty stands, where large Pine timber is being grown, fencing with an average life of ca. 20 years is preferable to repellents.

3779. Ueckermann, E. Schälschaden durch Damwild: Massnahmen zu ihrer Abwehr. **[Bark-scaling damage by fallow deer: measures for its control.]** *Forstarchiv* 24 (6), 1953 (147–53). 17 refs. [G.]

This deer does not scale the bark from trees in all W. German districts where it occurs, and the damage where it does so is on a far smaller scale than that caused by the red deer. The author's observations relate to E. Schleswig-Holstein. Here the species scaled, in descending order of preference, are (1) Ash and Poplar, (2) Silver Fir, Douglas Fir, Lime, Oak, Hornbeam, Maple, and (3) Beech, Spruce, Scots Pine, Alder. Larch and Birch are not damaged. The ages and season at which bark is removed are tabulated, the former varying from 3–15 years for Poplar to 6–35 for Ash and 8–40 for Spruce. Pathological and economic consequences vary with species, for some of which brief notes are included. Most damage occurs in the period Jan.–March and is attributable to scarcity of other food. Some cases are known, however, of what appears to be wilful damage at other seasons. In general, damage varies directly with density of deer population. Adequate control calls for a combination of measures: (*a*) Reduction of the population to a tolerable level, suggestions being offered on suitable numbers, which vary with natural deer-carrying capacity of the land. (*b*) Silvicultural measures, e.g. leaving suitable felled trees for fodder during cleaning or thinning. (*c*) Mechanical protection, which must extend a full 1·5 m. up the stem (e.g. barbed or other wire obstacles, or a *complete* mantle of brushwood tied round the stem) unless the whole area is fenced off (in which case the mesh must be smaller than 25 × 100 cm.). (*d*) Use of chemical repellents. Experience with the last has been as follows: Sinoxyd F [cf. *For. Abstr*. 15 (No. 270)] brushed on to Ash in spring 1951 failed to protect the trees in the subsequent winter from a deer population of 30–48/100 ha. On the less attractive Beech (damaged chiefly in spring and summer) its protective effect during summer appeared to be good and damage was slight. With a deer density of 45/100 ha. 'Weberscher Baumteer' was not sufficiently effective, but addition of dry fine sand before brushing on the preparation gave adequate protection [tree species not named]. Other preparations had some effect where deer populations were low, but failed where they were high.

3780. Graumann, K. Rationalisierter Wildverbissschutz. **[Rationalized protection against deer browsing.]** *Forstarchiv* 25 (1), 1954 (9–10). [G.]

In the middle 1930's, after some years of trials, the author was using a cheap lime/kerosene/linseed-oil mixture to protect the terminal buds of young trees in natural regeneration or plantations against red and roe deer. The mixture, brushed or painted on, gave good results. Since then, the cost has been reduced by: (1) using a mixture of 40–45 kg. slaked lime, 6 litres kerosene and 600 g. Adhäsit [a proprietary sticker], made up to 100 litres with water; (2) spraying this mixture on with 'Flügel's Pflanzenschutzpumpe'; and (3) employing a single team of 3 men, each equipped with a sprayer, to serve the whole forest district. Data are given from operations in the Hardehausen range, where 724,300 Spruce were treated between 25 Sept. and 9 Dec. 1952 (with frequent interruptions because of heavy rains). The cost was DM.2·24/1000 plants (wages DM.1·90, materials DM.0·34), this figure being an over-estimate since one of the sprayers was not acquired until late in the season. It may also prove possible to substitute cheaper industrial grades of petroleum for the illuminating kerosene so far used. The terminal buds of treated plants are said to have remained untouched, even where lateral shoots were browsed. The cap of lime also appears to have retarded flushing by a week, and so to have averted late-frost damage. Despite the rainy autumn, the application was almost everywhere successful, and the preparation was not only cheaper but also more effective than some other [unspecified] chemical and mechanical protective measures tried at the same time.

3781. **Hog damage to planted Pines.** *Rep. Sth. For. Exp. Sta. 1953*, 1954 (69–70).

Previous observations have indicated that hog rooting of young Slash Pines is much less on burned than on unburned areas. In 56 plots in a 4-year-old plantation, 377 out of 563 trees/acre were free of damage on unburned and 509 out of 568 on burned plots. Of the 59 trees damaged on the burned plots, 33 had been killed in the burning.

452. *Birds*

See also No. 3230.

3782. Frings, H., and Jumber, J. **Use of a specific sound to repel starlings (*Sturnus vulgaris*) from objectionable roosts.** *Science* 119 (3088), 1954 (318–9). 4 refs. O.R.S.

Wild starlings (in America) were induced to give a distress call by holding their legs and shaking them roughly. This sound was recorded. Broadcasting the sound through stationary loudspeakers or by mobile vans for several successive nights effectively cleared tree roosts in towns and the roosts remained clear until the time of autumn migration (1–2 months). The call was specific to starlings and did not repel other species. It was observed that trees from which starlings had been frightened were avoided even by birds driven from other places.

453. *Insects*

See also Nos. 3230, 3673, 3710–3, 3747,
3933, 4428, 4432–3.

3783. Luitjes, J., and Blankwaardt, H. F. H. Overzicht der beschikbare gegevens over insectenplagen in onze bossen en andere houtopstanden in het jaar 1952. **[Review of available data on insect pests in Dutch forests and other woody growth in 1952.]** *Ned. Boschb.-Tijdschr.* 26 (5), 1954 (117–28). 3 refs. [Du.du.e.] Also as *Meded. Inst. toegep. biol. Onderz. Nat.* No. 15.

Cf. *For. Abstr.* 14 (No. 3510).

3784. Bray, D. F., and Triplehorn, C. A. **Survey of the insect fauna of Red and Pin Oaks in Delaware.** *Bull. Del. agric. Exp. Sta.* No. 297, 1953. pp. 28. 19 refs.

In 1951 a survey of the insect fauna of *Quercus borealis* (*rubra*) and *Q. palustris* was made in an attempt to associate the occurrence of insects with a severe condition of dieback. At least 500 species in 365 genera were recognized and are here listed. No correlation was observed between dieback and any of the species studied.

3785. Thompson, W. R. [Editor], et al. **A catalogue of the parasites and predators of insect pests. Section 2. Host parasite catalogue. Part 2. Hosts of the Hymenoptera (Agaonidae to Braconidae).** Commonwealth Institute of Biological Control, Ottawa. 1953. pp. ii + 190.

Cf. *For. Abstr.* 13 (No. 3136).

3786. Kozikowski, A., and Niedzielski, L. Nietoperze (*Chiroptera*) wprzęgnięte do walki ze szkodliwymi owadami leśnymi. **[Chiroptera included in the fight against forest insect pests.]** *Sylwan* 98 (1), 1954 (23–30). 16 refs. [Pol.]

Of the 18 species of bat in Poland (listed), three live and hunt in forests during the summer, sheltering in the daytime in hollow trees, viz. *Nyctalus noctila*, *N. leisleri* and *Vespertilio murinus*. These, and *Pipistrellus nathusii*, *P. pipistrellus*, *Plecotus auritus*, *Vespertilio serotinus* and *Myotis dasycneme*, form part of the forest biocoenosis. All the above species were encountered near Gniezno, Poland. Bat boxes were made in 2 sizes: height 75 × width 20 cm., and 35 × 15 cm., the former for ♀s and broods, the latter as day shelter for ♂s. No confinement has however been recorded in the boxes during the 2-years' period of observation. Counts made every 10–14 days disclosed varying numbers of bats, up to 36 in 42 boxes. The bats were found to prey on *Dendrolimus pini* imagos, and on *Melolontha* sp.

3787. Rădulescu, T. Mecanizarea lucrărilor de protecţia pădurilor: maşinile de stropit. **[The mechanization of forest protection: motor sprayers.]** *Rev. Pădurilor* 68 (2), 1953 (22–5). [Rum.rum.russ.]

Describes, with illustrations, the 'Autofenomen' sprayer (made in Czechoslovakia), and the 'PSN-6' combined sprayer and duster (made in Germany) with instructions for their use, calculation of quantities of insecticide, time taken etc.

3788. Au sujet de l'aldrine et de la dieldrine. **[Aldrin and dieldrin.]** *Agron. trop.* 9 (1), 1954 (81–3). [F.]

Tabulated data on actual use of these insecticides, against soil, crop and orchard pests in Europe and the U.S.A. Data include name and habitat of pest, formulation and dosage of insecticide and general observations on application, efficacy etc.

3789. Hanna, A. D., and Nicol, J. **Application of a systemic insecticide by trunk implantation to control a mealybug vector of the Cacao swollen shoot virus.** *Nature, Lond.* 173 (4407), 1954 (730–1). 2 refs.

Following the successful control of mealybug by injecting dimefox (*bis*-dimethylamino fluorophosphine oxide) into the soil round infested trees [cf. *For. Abstr.* 13 (No. 3146)] experiments have been made in injecting it into the trunk of the tree at ground level. Successful control was effected by a dose of ca. 250 p.p.m. of the weight of the aerial parts of the tree, which reduces the mealybug population to one per tree compared with an average of 3770 per tree for controls.

Orthoptera

3790. Haber, A. Opaślik sosnowiec, *Barbitistes constrictus* Br. Watt (*Locustidae* Orth.). **[*B. constrictus*.]** *Roczn. Nauk leśn.* 1, 1953 (71–154). 32 refs. [Pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 101.)

[Cf. *For. Abstr.* 2 (p. 22).) Presents the results of the author's observations (since 1929) on *B. constrictus* and its occurrence in Poland, particularly in Pine stands. Mass outbreaks can cause serious damage, viz. loss of increment, stem deformation, and dieback. The generation cycle in Poland lasts 2 years. The natural enemies of the insect are listed; it can be controlled chemically by using Ca arsenite, DDT and BHC, the last giving the best results.

Thysanoptera

3791. Vité, J. P. Verbreitung und Formen des 'Lärchenwipfelsterbens' in Westdeutschland. **[Distribution and forms of the 'top dieback of Larch' [caused by *Taeniothrips laricivorus*] in Western Germany.]** *Forstarchiv* 23 (11/12), 1952 (225–9). 9 refs. [G.g.]

Cf. *For. Abstr.* 15 (No. 1568).

Hemiptera

See also Nos. 3223, 3789.

3792. Inouye, M. Monographische Studie über die japanischen Koniferen-Gallenläuse (Adelgidae). **[Monographic study on the Japanese Adelgidae.]** *Bull. Sapporo Br. For. Exp. Sta., Hokkaido* No. 15 (2nd ed.) 1953. pp. 91. 93 refs. [G.g.jap.]

Deals with the distribution, morphology and biology, systematics and importance of 9 *Pineus* spp., *Adelges japonicus* and *A. laricis* var. *karamatsu*, *Aphrastasia pectinatae* var. *ishihari* and *A. tsugae*, *Cholodkovskya viridana*, *Dreyfusia todomatsui* and *Sacchiphantes karafutonis*.

3793. RUMMUKAINEN, U. Über Triebschäden an jungen Fichten, verursacht durch die gelbe Fichten-Grossgallenlaus, *Sacchiphantes* (*Chermes*) *abietis* L., Cholodk. (Aphid., Chermesinae). **[Injury to shoots of young Spruce by *Adelges abietis*.]** *Annales Entomologici Fennici, Helsinki* 18 (4), 1952 (195–7). 2 refs. [G.] I.I.E.

Deformation or forking was observed in Spruce leaders as a result of attack by *A. abietis*.

3794. GAUMONT, R. Le cycle du *Chermes viridanus* (Chol.) (Homopt. Chermesidae (= Adelgidae.) **[The cycle of *C. viridanus*.]** *C.R. Acad. Sci., Paris*, 238 (8), 1954 (945–7). [F.] O.R.S.

C. viridanus on Larch in the Paris region differs from that in mountain districts and from other *Chermes* spp. in having 3 winged generations.

3795. TURČEK, F. J. Niektorí vtáci ako ničitelia vošky *Mindarus abietinus* Koch. **[Some birds as enemies of *M. abietinus*.]** *Lesn. Práce* 32 (10), 1953 (474–6). [Slovak.]

These aphids are eaten by *Loxia curvirostra*, *Carduelis spinus*, *Fringilla coelebs*, *Parus ater*, and *Regulus regulus*.

3796. SCHREAD, J. C. **Scale insects and their control.** *Bull. Conn. agric. Exp. Sta.* No. 578, 1954. pp. 23.

Describes the appearance and habits and results of experiments in chemical control of *Lecanium fletcheri*, *Coccus hesperidum*, *Unaspis euonymi*, *Pulvinaria floccifera*, *Lepidosaphes ulmi*, *Phenacaspis pinifoliae*, and *Eriococcus azaleae*.

3797. CANTELO, W. W. **Life history and control of *Euonymus* scale [*Unaspis euonymi*] in Massachusetts.** *Bull. Mass. agric. Exp. Sta.* No. 471, 1953. pp. 31. 40 refs.

Lepidoptera

See also Nos. 3819, 3836, 3897.

3798. STARK, R. W. **Distribution and life history of the Lodgepole needle miner (*Recurvaria* sp.) (Lepidoptera: Gelechiidae) in Canadian Rocky Mountain Parks.** *Repr.* from *Canad. Ent.* 86 (1), 1954 (1–12). 35 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 96.)

3799. HENSON, W. R., STARK, R. W., and WELLINGTON, W. G. **Effects of the weather of the coldest month on winter mortality of the Lodgepole needle miner, *Recurvaria* sp., in Banff National Park.** *Repr.* from *Canad. Ent.* 86 (1), 1954 (13–9). 2 refs. (*Contr. Div. For. Biol. Dep. Agric. Can.* No. 97.)

Winter mortality is distributed in the same way as the zones of extreme cold that occur during the coldest winter month. Since the dominant type of air circulation may differ from year to year, the zones of extreme cold may occur either at the valley bottoms or at the tops of slopes. Survival therefore is highest along the middle of the slopes, and it is here that the main control operations should be concentrated.

3800. STARK, R. W. **Sequential sampling of the Lodgepole needle miner [*Recurvaria* sp.]** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (2), 1954 (2–3).

The limits of population density classes set in 1951 [cf. *For. Abstr.* 14 (No. 2452)] have proved to be too low, and a revision has now been made. The new limits, presented in a table, give a reasonably accurate indication of defoliation, either present or to be expected. It is also possible to estimate the number of years within which trees may be expected to die, if the outbreak falls in the heavy class (> 55 live larvae per tip). The year and time of year at which the samples are taken is of great importance in assessing the outbreak. The one time when the samples may be applied to defoliation estimates, with the sure knowledge that only a decrease can follow, is in the fall of the even-numbered years when the larvae are those resulting from egg-laying of the previous generation of moths. If the samples are taken in the odd years, the number of larvae indicated are the survivors of the original population, and further information is required to make reasonably precise defoliation estimates.

3801. WISE, K. A. J. **Occurrence of the Oak blotch miner *Lithocolletis messaniella* Zeller (Lepidoptera: Gracillariidae) in New Zealand.** *Transactions of the Royal Society of New Zealand, Wellington* 81 (1), 1953 (65–6 + 1 photo). 4 refs. O.R.S.

A description of the insect, with notes on its occurrence in New Zealand and elsewhere and on the damage it causes.

3802. KEEN, F. P. **Correction of identity of the Douglas Fir cone moth.** *J. econ. Ent.* 46 (6), 1953 (1107–8). 9 refs.

A review of the evidence shows the identity of this moth to be *Barbara colfaxiana* and its varieties. The names *Cydia pseudotsugana* and *Zeiraphera diniana* do not belong to this insect, but have been applied in error.

3803. NEUGEBAUER, W. Die Bekämpfung des Kieferntriebwicklers. **[The control of *Rhyacionia buoliana*.]** *Forstarchiv* 23 (8), 1952 (159–65). 35 refs. [G.g.]

Reviews existing information, with the main conclusion that since mechanical, chemical and biological control measures appear so far to be uneconomic or insufficiently effective, the key to the problem must be sought in prevention, with chief emphasis on host resistance. Species of *Pinus* that produce abundant resin, e.g. *P. nigra*, *P. strobus* and the American 'southern' Pines, are more or less immune: *P. sylvestris*, the chief host, is comparatively poor in resin, but its resin production is influenced by site factors, especially temperature and water supply during the growing season. Some rather general suggestions are therefore made on silvicultural measures offering prospects for the prevention of large-scale attack by favouring host resistance, viz.: selection of *Pinus* species and provenances suited to the site; good soil cultivation and fertilizing when plantations are formed; planting mixed Pines (e.g. *P. sylvestris*/*P. strobus*) at wide spacing with deciduous auxiliary species, to avoid the severe root competition that occurs in pure stands; maintenance of adequate canopy for soil protection; and the protection of plantation areas (which should be as small as practicable) by adjacent older forest or, if this is impossible, by protective belts of deciduous species. Two cases are briefly discussed: (*a*) poor, shallow soils in cold sites, including compacted and podzolized soils; (*b*) better soils in the warmer Pine sites.

3804. Blais, J. R. **Effects of the destruction of the current year's foliage of Balsam Fir on the fecundity and habits of flight of the Spruce budworm.** *Repr.* from *Canad. Ent.* 85 (12), 1953 (446–8). 8 refs.

It has already been demonstrated that adults from 5th- and 6th-instar larvae of *Cacoecia fumiferana* reared on old foliage produce fewer eggs than insects reared on the current year's growth [cf. *For. Abstr.* 13 (No. 4031)]. Field studies were made in 1950, 1951 and 1952 to find whether the destruction of new foliage of Balsam Fir affects the fecundity of the insect. The results indicated that when populations increase to the point where all the current year's growth is destroyed before completion of the larval stage, the number of eggs per surviving ♀ adult decreases, and that fecundity increases again as populations decline to the point where defoliation of the current year's growth is not complete.

3805. Balch, R. E., Webb, F. E., and Morris, R. F. **Results of aerial spraying against Spruce budworm in New Brunswick, Canada.** *FAO Plant Prot. Bull.* 2 (6), 1954 (83–5). 1 ref. I.M.I.

[Cf. *For. Abstr.* 14 (No. 1578).] Mortality of the larvae varied with the time and number of applications, ranging from 75 to 100%. The highest kills were obtained when spraying was latest and larvae were most exposed. The largest amount of new foliage surviving (70%) was on the area sprayed in both 1952 and 1953. Reinfestation of sprayed areas was general although less than in 1952. There is no evidence of a decline in the outbreak as a result of spraying. The new technique of doubling the distance between flight lines gave satisfactory coverage.

3806. Henze [, O.] 20 Jahre erfolgreicher Vogelschutz gegen den Eichenwickler. **[Twenty years of successful bird protection for the control of *Tortrix viridana*.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 24 (No. 2/7), 1953. pp. 4. 2 refs. [G.] Limited distribution.

Discusses the decrease in the damage by *T. viridana* in a 60-ha. Oak stand in S. Germany after 150 nesting boxes were established. After the first 8 years increment began to increase steadily. Cost of the boxes was DM. 2/ha. and the estimated value of the loss in annual increment before their installation was DM.75. [Cf. *For. Abstr.* 12 (No. 2388).]

3807. Ene, M., and Parascan, D. *Apterona crenulella* Brd., dăunator forestier. **[*A. crenulella*, a forest pest.]** *Rev. Pădurilor* 68 (2), 1953 (19–21). 5 refs. [Rum.rum.russ.]

Notes on identification of the insects, type of damage, and control measures. Among species attacked are *Prunus mahaleb*, *Quercus cerris*, *Robinia pseudoacacia*, and *Ulmus pumila*.

3808. Crooke, M. **An outbreak of the Pine looper moth (*Bupalus piniarius* L.) at Cannock Chase in Staffordshire, and some notes on the biology of the pest.** *Irish For.* 10 (2), 1953 (60–3).

3809. Klomp, H. **The role of *Trichogramma evanescens* Westwood in the natural control of Pine wood moths in the Netherlands.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 24 (No. 2/8), 1953. pp. 3. 10 refs. [E.] Limited distribution.

It is concluded from a study of the life cycle of *T. evanescens* and of parasitized eggs of *Bupalus piniarius* that the dense population of *T. evanescens* built up on *B. piniarius* eggs parasitized in June–July will largely die without finding host eggs for further reproduction. The average life of ♀ parasites was found in experiments to be 18 days and is probably much less in nature. When no fresh eggs of *B. piniarius* are available ⅓ of the total population of *T. evanescens* has emerged, and only a small number of the remaining ⅔ will survive till the second half of August when second-generation eggs of *Acantholyda nemoralis* and *Larentia firmata* are available. In the 1951 investigations 30% of the total number of eggs of *B. piniarius* and 20 to 90% of eggs of other species were parasitized.

3810. Vago, C., and Vasiljevic, L. Détection d'une maladie à virus parmi les populations européennes de l'écaille fileuse (*Hyphantria cunea* Drury Lepidoptera) actuellement en progression. **[Detection of a virus disease now in progress among European populations of *H. cunea*.]** *C.R. Acad. Agric. France* 39 (16), 1953 (735–6). 6 refs. [F.] A.P.B.

An examination of material from Jugoslavia [cf. *For. Abstr.* 14 (No. 1358)] revealed in 5th-instar larvae from Subotica a large number of polyhedral bodies with the hexagonal shape typical of the *Borrelina* viruses.

3811. Thiem, E. Die Spätwinterspritzung, ein Verfahren zur Bekämpfung der Goldafter- und Eichenprozessions-Spinnerraupen. **[Late winter sprays for control of *Euproctis chrysorrhoea* and *Thaumetopoea processionea*.]** *NachrBl. dtsch. PflSchDienst.* 8 (5), 1954 (90–3). 10 refs. [G.]

Control of these two pests presents a special problem because of the resistance to insecticides of the later larval stages. Through laboratory and field experiments by the Biologische Zentralanstalt, Berlin-Kleinmachnow, it was discovered that late winter sprays with high concentrations of DDT/BHC emulsions give good control of both pests. Best results were obtained with a preparation named Duplinon [composition not specified].

3812. Acatay, A. Çam keseböceği (*Thaumetopoea pityocampa* Schiff. = *Thaumetopoea wilkinsoni* Tams.) hakkında araştırmalar ve adalardaki mücadelesi. **[The biology of the Pine processionary moth *T. pityocampa*.]** *Istanbul Üniv. Orm. Fak. Derg.* 3*A* (1/2), 1953 (29–47 + 5 plates). 6 refs. [Turk.e.]

An outbreak of *T. pityocampa* occurred in *Pinus halepensis* var. *brutia* stands during 1942–44 on Princes Island near Istanbul. Notes are presented on the habits and life history of the insect as observed in this area.

Coleoptera

See also Nos. 3224–5, 3545, 3617, 3730, 3744–7, 3933.

3813. Sorauer, P. [Edited by Blunck, H.] Handbuch der Pflanzenkrankheiten. Band V. Tierische Schädlinge auf Nutzpflanzen. 2. Teil. 2. Lieferung. **[Manual of plant pathology. Vol. V: Animal pests of useful plants. Pt. 2. No. 2.** [: **Coleoptera**].] Paul Parey, Berlin. 5th ed. (rev.) 1954. pp. 599. Many refs. [G.] Price [£11. 6*s*. 0*d*.]

Cf. *For. Abstr.* 15 (No. 1559).

3814. Mott, D. G. **Secondary insects in chemically debarked trees.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (2), 1954 (1).

Examination of trees girdled and treated with Na arsenite to facilitate barking, showed that they sustained rather high beetle populations. An ambrosia beetle (*Trypodendron bivittatum*), two bark beetles (*Pityokteines sparsus* and *Polygraphus rufipennis*), and a borer (*Monochamus scutellatus*) were found. Populations and depth of penetration became smaller as the date of girdling became later, and in trees treated after the beginning of August, damage was negligible. Spruce budworm populations were high in two of the treated areas. Defoliation patterns on the understorey indicated that the chemical did not affect the budworm larvae immediately, but caused them to drop only after the foliage had died.

3815. Menon, K. D. **Needle-worm of Kapur (*Dryobalanops aromatica*).** *Malay. Forester* 17 (2), 1954 (80–3).

Examination of a number of logs showed that this lymexylid borer attacks only trees affected with rot, that the larval tunnels run outward from the area of decay towards the sapwood, and that they never enter the sapwood. The larvae and their tunnels are described. The need for further observation is indicated.

3816. Jacquiot, C., and Guillemain-Gouvernel, J. Action sur les tissus des pousses de chêne (*Quercus sessiliflora* Sm.) de deux principes actifs extraits de la vermoulure des galeries d'*Agrilus biguttatus* Fab. (Coléopt. Buprestidae). **[Effect on the shoot tissues of *Q. sessiliflora* of two active principles extracted from dust in the galleries of *A. biguttatus*.]** *C.R. Acad. Sci., Paris* 238 (8), 1954 (924–6). [F.f.] O.R.S.

Different reactions in the cambium, adjacent vessels and parenchyma were obtained from injections of two groups of extracts. [Cf. *For. Abstr*. 13 (Nos. 486, 1383).]

3817. Orlando, A., Menezes, F. A. Mariconi, and Iba, S. 'O besouro de Limeira,' praga de plantas frutíferas, eucaliptos e algumas outras culturas. **[*Colaspis quatuordecimcostata*, a pest of fruit trees, Eucalypts and some other crops.]** *Biológico* 20 (1), 1954 (1–10). 3 refs. [Port.e.] C.G.B.

Describes *C. quatuordecimcostata*, now a serious pest of *Eucalyptus citriodora* and *E. alba* and other plants in Limeira São Paulo. Nine insecticidal sprays and dusts were tested against it. The results are tabulated. A small plantation of *Eucalyptus* was successfully dusted from the air with 2% γBHC, although in fact 1% γBHC was proved equally effective.

3818. Crosby, D. **How to control the White Pine weevil [*Pissodes strobi*] with a hand sprayer [using Pb arsenate].** *For. Res. Note Ntheast. For. Exp. Sta.* No. 30, 1954. pp. 3.

Practical instructions.

3819. Lekander, B. Om märgborrens och större tallvivelns uppträdande i skog tidigare angripen av tallfly- och tallmätarlarver. **[The occurrence of *Blastophagus piniperda* and *Pissodes pini* in forests previously attacked by larvae of *Panolis flammea* and *Bupalus piniarius*.]** *Medd. SkogsforsknInst., Stockh.* 44 (3), [1954]. pp. 31. 8 refs. [Sw.g.]

Analysis of secondary damage by *B. piniperda* showed that, where the species is already abundant, about 30% of Pine trees in stands already weakened by attacks by *P. flammea* and *B. piniarius* will be killed. The average diameter of trees killed will be 10–15% below the average stand diameter. Where the original population of *B. piniperda* is small, damage is unlikely to be serious. Damage by *P. pini* is confined to trees of the smallest diameters and is unlikely to be of importance.

3820. Butovitsch, V. Die Einwirkung der Läuterungszeit auf die Vermehrung des grossen Waldgärtners, *Blastophagus piniperda*. **[The effect of the date of cleaning on the population of *B. piniperda*.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 24 (No. 5), 1953. pp. 4. [G.] Limited distribution.

Research in Sweden has shown that infestation of young Pine (as shown by the number of flight holes and galleries in the felled trees left in the woods a year after the date of cleaning) is least for cleanings made in May–June and highest for those in Sept.–Oct. A study of different dimensions showed that smaller stems (3–6 cm.) could be cleaned at any time until late August without serious infestation, but that cleanings in 7- to 10-cm. Pine should take place before the end of June. If the basal, thick-barked portion of the stem is severed, the felled wood dries out quicker and cleaning in 3- to 6-cm. Pine can be done at any time during the summer and in 7- to 10-cm. Pine until the end of July.

3821. Morofsky, W. F. **The correlation of bark beetles and wood borers to slash disposal in Michigan.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (3), 1954 (432). [Michigan State College.] O.R.S.

A study of plantations of *Pinus resinosa* and *P. banksiana* showed that 2 species of Cerambycidae and 7 of Scolytidae were present. All the species are of economic importance in slash-disposal methods, some building up to epidemic proportions in the slash and attacking living trees, others helping in slash breakdown. In areas studied in the Kellogg Forestry tract and the Higgins Lake State Forest, lopping and scattering, lopping and leaving, windrowing, and piling are common methods of slash disposal, and all were found to encourage increase, sometimes to epidemic proportions, of insect populations. It was found, however, that in windrowing and piling, putting the butt end of the slash to the middle of the piles (reversing the normal procedure) prevented the establishment of insect populations so that no significant infestations developed. Where slash piles or windrows exceeded 36–40 in. in height, populations increased in the upper part of the slash.

3822. Kangas, E. Über die Brutstättenwahl von *Dendroctonus micans* Kng. (Col., Scolytidae) auf Fichten. **[Selection of breeding places by *D. micans* on Spruce.]** *Annales Entomologici Fennici, Helsinki* 18 (4), 1952 (154–70). Many refs. [G.] I.I.E.

[Cf. *For. Abstr.* 15 (No. 1561).] Observations by the author show plainly that *D. micans* chooses for its attack fairly healthy or completely sound trees. The same tree is singled out for attack in successive years but when its condition deteriorates it is abandoned. The pattern of attack on different parts of the tree seems to result from a definite choice, the reasons for which are difficult to determine. The influence is discussed of resin exudations and of the fungi *Dasyscypha resinaria* and *Fomes annosus* on the part of the tree chosen for attack.

3823. Husson, R., and Stauder, F. À propos du '*Dendroctonus micans*' Kug. Coleoptera Ipidae. **[*Dendroctonus micans* [its life history and damage].]** *Rev. for. franç.* 6 (6), 1954 (355–9 + 1 plate). 10 refs. [F.]

3824. Petersen, B. B. *Hylesinus micans*, artens udbredelse og en oversigt over dens optræden i Danmark. **[*Dendroctonus micans*, its geographical distribution and a survey of its occurrence in Denmark.]** *Dansk Skovforen. Tidsskr.* 37 (6), 1952 (299–322). 33 refs. [Dan.e.]

Up to 1940 *D. micans* had little economic importance in Denmark and bred only on *Picea abies*; since then, it has become a serious pest of *P. sitchensis*, which is extensively planted on heaths and dunes, as well as of *P. abies*. A survey based on replies to a questionnaire circulated in 1949 revealed ca. 80 centres of attack. There had been a marked increase since 1947, and attacks were still spreading. The beetle breeds in Denmark on *Picea* (*P. sitchensis*, *P. abies*, *P. glauca*, *P. orientalis*, *P. pungens*) and *Pinus* (*P. sylvestris*, *P. contorta*, *P. mugo*), but only attacks on the first two *Picea* spp. are of major importance, being most serious in stands over 30 years old. They occur mostly in plantations on sandy soil, and often seem to be connected with infection by *Fomes annosus* and with drought, especially the severe drought of 1947; no important connexion appears to exist with bark injuries, heavy thinning, or other pests. The serious infestations cover ca. 700 ha. and minor infestations occur over a much wider area. *D. micans* is a serious pest economically; it breeds in trees that are at least nearly healthy, and it has caused premature felling of many stands of *P. sitchensis*. No effective control measures have so far been found in Denmark. *From author's summary.*

3825. Gøhrn, V., Petersen, B. B., and Henriksen, H. A. *Dendroctonus micans* Angriffe und ihre Verhältnis zum Durchforstungsgrad. **[Attacks by *D. micans* and their relationship to thinning grade.]** *[Pre-issue] Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 24 (No. 2/3), 1953. pp. 5. [G.] Limited distribution.

Research in a dune plantation of Sitka Spruce in Denmark showed that *D. micans* spread most rapidly into moderately and heavily thinned areas. Laboratory tests suggested that Pb arsenate might be used as a stomach poison, but results of field experiments were generally unsuccessful. There appeared to be a slight increase in attack on trees of larger diameters. The biology and development of the insect are discussed.

3826. Massey, C. L., Chisholm, R. D., and Wygant, N. D. **Chemical control of the Engelmann Spruce beetle in Colorado.** *J. econ. Ent.* 46 (6), 1953 (951–5).

The main object of the tests reported was to develop emulsifiable concentrates of insecticides for dilution with water available at points near the infected trees, so reducing costs and difficulties of transport. The fumigants, tested in emulsions and solutions, included commercial grades of (1) dichloroethyl ether, (2) $C_2H_4Br_2$, (3) *o*-dichlorobenzene, (4) *p*-dichlorobenzene, (5) trichlorobenzene, (6) chlorinated napthalene, and (7) lindane. They were dissolved in No. 1 fuel oil or Stoddard solvent. The materials were applied to standing trees by means of a bucket pump, and to log sections both in the field and in the laboratory by means of a tank-type pressure sprayer. (2) was the only effective fumigant tested in the emulsions. A minimum of 15% oil in the spray is necessary. The maximum dosage tested, viz. 3 lb. $C_2H_4Br_2$/5 gal. emulsion, was required to obtain a satisfactory kill. In the oil solutions (2) was again the most effective but (1), (3) and a mixture of (3) and (4) also gave good results. In oil solutions 1·5 lb. of (2) is as effective as 3 lb. in an emulsion, but the increased cost of the additional fumigant in the emulsion is more than offset by the larger proportion of oil in the solution and the higher transport costs.

3827. Sierpiński, Z. Spostrzeżenia nad możliwością chemicznego zwalczania drwalnika paskowanego *Xyloterus lineatus* L. **[Remarks on the feasibility of chemical control of *X. lineatus*.]** *Sylwan* 98 (1), 1954 (63–7). 1 ref. [Pol.]

Tabulates the numbers of dead imagos of *X.* [*Trypodendron*] *lineatus*, *Hylurgops palliatus*, and some other species, collected on paper sheets under 6 Spruce trees dusted with one of the following insecticides: (1) BHC + DDT (1/1), (2) 10% DDT, (3) a Swiss preparation 'Hexapuder', and (4) 'Intox 8'. *X. lineatus* was particularly sensitive to BHC.

3828. Inouye, M., Koizumi, C., and Takai, M. **[Studies on Todo-Fir [*Abies mayriana*] barkbeetle *Polygraphus proximus* Blandford (Ipidae). (I).]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (103–7). [Jap.e.]

An account of its depredations in Japan, and of its observed development in trap logs.

3829. INOUYE, M., KOIZUMI, C., and TAKAI, M. **[The hibernation of the Todo Fir [*Abies mayriana*] barkbeetles, *Polygraphus proximus*, *Cryphalus piceae* and *C. piceus*.]** *J. Jap. For. Soc.* 36 (5), 1954 (127–9). [Jap.e.]

The young adults of these species were found to migrate to the trunks of young Todo Fir in September to October, boring into the bark and hibernating there till the following June or July.

3830. INOUYE, M. **[Studies on the relation between barkbeetle attack and moisture content of the sapwood of conifers in the virgin forest of Hokkaido.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (167–80). 22 refs. [Jap.e.]

Measurements of moisture contents of wood and density of beetle galleries were made on sample pieces from one tree each of *Picea jezoensis*, *P. glehnii*, *Abies sachalinensis* and *A. mayriana*. The optimum moisture contents for each beetle were: *Polygraphus jezoensis* 138–175%; *Ips typographus* f. *japonicus* 53–116%; *Polygraphus gracilis* 39–76%; and *P. proximus* 45–145%. *From author's summary.*

3831. MERKER, E. Lockstoffe und Nährstoffe in Wirtspflanzen einiger Waldschädlinge. **[Attractants and nutrients in the host plants of some forest insect pests.]** *Allg. Forst- u. Jagdztg.* 124 (5), 1953 (138–44). 11 refs. [G.g.e.]

Analyses of phloem sap from (1) Spruce, (2) Pine, (3) Silver Fir, (4) Larch, (5) Douglas Fir and (6) *Tsuga heterophylla* by paper chromatography showed the presence of sucrose, fructose and glucose, totalling 10–15% of the sap, with no large differences in [total?] content between the species. Other unidentified sugars were also present in small quantity. If the sugars constituted the attractants for barkbeetles and weevils, all these conifers should be attacked in nature by the same beetles: the specificity of their attacks means that the attraction must be due to other substances, and in experiments it proved impossible to attract the beetles from a distance with sugars alone, whereas addition of a trace of phloem sap had an immediate attractant effect. Many hundreds of experiments were made with bark and expressed phloem sap of the above hosts, only those with the sap being reported in this paper. Before the experiments the barkbeetles and weevils used were kept for several days on filter-paper balls moistened with 2·5% sucrose solution for food, and the same with tapwater for drink. All did well and could live for long periods on this diet. After such preparation, the object of which was to rid them of contaminating odours, the beetles were exposed to the odours of phloem saps, variously diluted and with or without added sugar, on various substrates. Spotting the sap on to flat filter-paper was satisfactory for the weevils, whose proboscis enables them to feed without extra support; but the barkbeetles did better with several strips of filter-paper held loosely together so that they could creep between the strips, and best of all in pieces of sunflower pith into which they could bore. To exclude sight as a possible factor, some of the experiments with weevils were made in darkness, and for the barkbeetles the treated and control pieces of pith were buried 2 cm. deep in soil. In both cases the treated material was readily found. *Hylastes cunicularius* was attracted by sap of (6), (1), (5) and (2) [figures here, and subsequently, given in descending order of preference]; its reaction, however, was so slow as to suggest that it is not most strongly attracted by fresh phloem sap. *Ips typographus* was attracted by sap of (1), (6), (2), (4), (5), and (3), with a strong preference for (1)—its natural host, sap of which was found and preferred to water controls even at a dilution of 1/1000. *I. cembrae* preferred saps in the order (6) and (4), (1) and (2), (5), and (3). Sap of (4), the natural host, was found and preferred to water controls at a dilution of 1/1000. The weevils used were *Hylobius abietis* and *H. pinastri.* Hungry weevils put near a spot of sap adopted the characteristic 'smelling posture', raising and moving their antennae, and then moved, at first uncertainly, towards the sap. If the antennae, are removed, the smelling posture is not adopted and the food is found only by accident—contact with the mouth parts being necessary for recognition. Behaviour of the weevils became unpredictable when they were thirsty and also at the time of oviposition, but otherwise clear recognition of sap odours was not in doubt, the order of preference being (2), (1), (3), (5), (4), (6). The smelling posture was not adopted to sugar alone, nor was any attractant effect of sugar observed, though the addition of a little pure sugar to sap so diluted as to eliminate the effect of the natural sugars, increased the amount of feeding. In general, the unknown attractant substances (said not to be resins) have a short-term stimulating effect which must be combined with the presence of nutrients, e.g. sugars, if continued feeding is to take place.

3832. LACHAUSSÉE, E. Pluviosité et bostryches. **[Precipitation and barkbeetles.]** *Bull. Soc. for. Franche-Comté* 27 (1), 1954 (11–6). [F.]

Explains a method of expressing seasonal 'pluviosity' graphically by constructing rectangles with one side representing frequency (= number of days with rain or snow) and the other abundance of precipitation (rain and snow-water) measured in mm., for a given period. Data for a meteorological station in the Jura for 1941–53 are plotted in this way separately for each of the four seasons of the year, and the results are correlated with the severe outbreaks of barkbeetle that have occurred during the period. The different reaction of *Abies alba* and *Picea abies* to drought and barkbeetle attack are described. In no fewer than 10 of the 13 years considered, one or more seasons were below the normal in 'pluviosity', and four of them (1942, 1946, 1949 and 1950) had a deficit in all 4 seasons.

3833. SCHWERDTFEGER, F. Der Einfluss der Umweltbedingungen auf Entstehung und Verlauf der Borkenkäfer-Epidemie 1943/1950 in Westdeutschland. **[The influence of environmental conditions on the origin and development of the barkbeetle epidemic of 1943–50 in W. Germany.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 24 (No. 2/6), 1953. pp. 4. [G.] Limited distribution.

Conclusions are that the danger is greater in Spruce plantations outside the natural range of the species, that mixed and pure stands are equally damaged, that attack is more serious on drier sites, and that open stands and stand edges, where the temperature is higher, suffer greater damage. A full report is to be published elsewhere.

3834. MERKER, E. Das Wetter der Jahre 1939 bis 1950 und sein Einfluss auf die Massenvermehrung des grossen Fichtenborkenkäfers in Südbaden. **[The weather of the period 1939–1950 and its influence upon the mass reproduction of *Ips typographus* in S. Baden.]** *Allg. Forst- u. Jagdztg.* 123 (8), 1952 (213–33); 124 (1), 1952 (1–22). 32 refs. [G.]

A detailed review is made of information from researches by the author and other workers, with special reference to the two areas (Schwarzwald and round the N.W. end of Lake Constance) where bark-beetle damage has been most severe, under the heads: climate of 'beetle years'; influence of climate on the course of outbreaks; and non-climatic and micro-climatic factors favouring outbreaks. The period reviewed was one of drought years recurring at close intervals; this factor and temperature decide whether 1, 2 or 3 beetle generations occur annually. Nevertheless, the first outbreaks were not in the warmest areas but in the Schwarzwald, where large accumulations of windthrown and snow-damaged timber maintained a high reserve population of beetles, providing the means for very rapid initial multiplication and sustaining the population throughout the outbreaks, the volume of beetle-killed timber increasing steadily up to 1947 and remaining almost as high in 1948. In the warmer areas round Lake Constance, where no great amount of windthrown timber existed, serious damage began a year later, and though by 1946 the favourable climate had produced the highest beetle populations in the country, the beetle-damaged timber decreased considerably in 1947 to 1948 owing to lack of suitable host material. The susceptibility of Norway Spruce to *I. typographus* is correlated with water supply; thus summer rainfall is normally of first importance, but in drought seasons the available soil water becomes a critical factor [cf. *For. Abstr.* 14 (No. 1373)], dry or fast-drying soils being very favourable to the beetle. Such sites carry high reserve populations and are shown by past records to be permanent danger spots. As a result of the studies to date, it should now be possible to define the most endangered areas with some precision and to watch them for the first signs of outbreaks. It is intended that the more seriously threatened should be converted to mixed forest, and that on some, Spruce should be abandoned altogether.

3835. MERKER, E. Die biologische Unterdrückung von Waldschädlingen. **[The biological control of forest pests.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 24 (No. 2/9), 1953. pp. 5. [G.] Limited distribution.

Discusses research in Germany [see preceding abstracts] on the weather and site conditions favouring barkbeetle attack, and ways of recognizing unfavourable sites.

3836. MANDEL, G. Über den Einfluss des Standorts auf das Auftreten der Nonne. **[The influence of site on the occurrence of nun-moth [outbreaks].]** *Allg. Forst- u. Jagdztg.* 124 (6), 1953 (172–5). 4 refs. [G.]

Refers to Merker's findings for *Ips typographus* [see preceding abstracts] and discusses, in general terms, analogies in the incidence of insect attacks on Norway Spruce in an [unnamed] district of central Germany, with special reference to *Lymantria monacha*. A severe outbreak of this pest, which occurred in this district alone of those in the region, was confined to areas with naturally wet humous and peaty soils where Spruce develops a shallow root system and is seriously weakened in severe drought years by soil drying. Attacks by *Ips typographus* and *Panolis flammea* have also coincided with these areas.

3837. WAUTHOZ, V. Le chalcographe sur les jeunes plantations d'épicéa en 1953. **[*Pityogenes chalcographus* on young Spruce plantations [in Belgium] in 1953.]** *Bull. Soc. for. Belg.* 61 (5), 1954 (245–8). [F.]

3838. ENE, M. Relativ la utilizarea sulfurii de carbon şi a nitroxanului in combaterea larvelor de cărăbuşi. **[The use of CS_2 and BHC against chafer grubs.]** *Rev. Pădurilor* 68 (3), 1953 (38–41). 4 refs. [Rum.rum.russ.]

CS_2 is introduced into the soil by injection, BHC at the time of cultivation. Notes are given on dosages etc.

3839. TASHIRO, H., and GAMBRELL, F. L. **Control of the European chafer on deciduous nursery stock in situ.** *J. econ. Ent.* 46 (6), 1953 (956–60). 2 refs.

Where large trees are removed with a ball of soil from untreated nursery plantings, a need has developed for a surface fumigation treatment against *Amphimallon majalis*. In autumn 1951 the use of a $C_2H_4Br_2$/chlordane mixture, known as U.S. mixture 253, at a rate of 40 ml./1 gal. water/sq. yd. gave 100% control of third-instar larvae at the end of a 5-day exposure period when the temperature was above 50° F. Several groups of trees were free from infestation at the time of digging and all were free 1 week after digging. In the autumn of 1952 nearly as good results were obtained with 20 ml. as with 40 ml./1 gal. water/sq. yd. Less promising results were obtained in the spring of 1952. No phytotoxic symptoms appeared on any tree.

3840. LUCA, E. O experimentare de combatere a larvelor cărabuşului de Iunie (*Amphimallus solstitialis* L.). **[An experiment in the control of *Amphimallon solstitialis* grubs.]** *Rev. Pădurilor* 68 (11), 1953 (44–6). [Rum.]

Successful control was obtained with Nitroxan [5% BHC] powder worked into the soil of nursery beds, provided that it was worked in to a sufficient depth. [Cf. *For. Abstr.* 14 (No. 515).]

3841. SCHINDLER, U., and SCHNEIDER, G. Versuche zur Engerlingsbekämpfung bei Streifenkulturen unter besonderer Berücksichtigung der Pflanzlochbegiftung. **[Experiments on the control of cockchafer grubs in plantations on cultivated strips, with special reference to the treatment of planting holes with insecticides.]** *Allg. Forst- u. Jagdztg.* 124

(5), 1953 (131–7). 12 refs. [G.g.] [Niedersächsische Forstliche Versuchsanstalt, Sieber/Harz.]

Gives details of trials made in spring 1951 in the Lüneberg forest district for the protection of young Scots Pine on land heavily infested with grubs of *Melolontha hippocastani*, using two pure [both γ?] BHC dusts—Hortex and Gamma-Streunex—which gave equally good results. Conclusions are as follows: (1) Good protection is given by dusting the planting holes; 3 g. per hole appeared sufficient even with high grub populations, and more than 5 g. should be unnecessary. On light soils the most appropriate practice is notch planting with the ordinary spade, dusting the BHC into the notch with a spoon filed down to measure the correct dose: on heavy soils, notching with a concave spade and dusting from a 1-litre box with perforated lid. Thorough mixing of the BHC with the soil did not give significantly better protection than simply dusting the holes. Ball planting in BHC-treated holes is recommended for beating up partially damaged plantations, provided that the increased costs can be borne. (2) Though results from trials with BHC applied to the whole of the strips, to the plant rows or to furrows beside the rows, were inconclusive as to suitable dosage (those tried being equivalent to 1·5 and 3 kg./are), owing to variations in grub populations, the protective effects of all 3 types of application were very satisfactory. Such methods, however, would only be advantageous if combined with mechanical cultivation of the strips or with machine planting. There is a need for designing simple dusting devices for such machines, when the cost of treatment could be reduced to that of the insecticide. (3) Several methods of introducing the BHC into the soil by cutting variously arranged slits or furrows near the plants, were tried for their possible applicability to infested plantations several years after formation. All, using the same dosages as at (2), gave satisfactory protection against the grubs, but there is a risk that roots may be cut or damaged in making the slits, with consequent checking of growth. At all events, treatment at this stage is expensive, may come too late to save the plants, and should be undertaken only in exceptional circumstances.

Hymenoptera

See also Nos. 3226–7, 3239

3842. SZMIDT, A. Wstępne badania nad zastosowaniem pasożyta *Microplectron fuscipennis* Zett. do walki biologicznej. **[Preliminary studies on the use of the parasite *M. fuscipennis* for biological control [of *Diprion* sp.].]** *Sylwan* 98 (1), 1954 (31–7). 4 refs. [Pol.]

Presents results of laboratory studies on the possibility of mass breeding of *M. fuscipennis*, and the effect of food and temperature on longevity.

3843. LINDQUIST, O. H. **Ichneumonid parasites of *Neodiprion* spp. [*N. abietis*, *N. burkei*, and *N. rileyi* in Saskatchewan].** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (1), 1954 (3).

3844. BIRD, F. T. **The use of a virus disease in the biological control of the European Spruce sawfly, *Diprion hercyniae*** (Htg.). *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (1), 1954 (2–3).

Studies of individual trees have shown that epizootics start each year from infection of a very small % of the larval population. The disease spreads rapidly and causes the greatest mortality in the second generation. Very little virus remains on the trees over winter, owing to the cleansing effect of rains, and initial infection each year is due to transmission of virus via the eggs of infected adults.

3845. BIRD, F. T. **The use of a virus disease in biological control of the European Pine sawfly, *Neodiprion sertifer*** (Geoffr.). *Repr.* from *Canad. Ent.* 85 (12), 1953 (437–46). 12 refs.

A virus disease of *N. sertifer* was introduced into sawfly-infested Scots Pine plantations in southern Ontario. The % and rate of mortality from the disease depended on the quantity of virus used, method of dissemination, and stage of larval development at the time of spraying. Over 90% mortality resulted 14 days after virus suspensions containing 200,000 polyhedra/ml. water, were sprayed with a 3-gal. pressure sprayer. Heavy mortality from virus, over 5 and 7 acres of infested Pine, also resulted 18 and 27 days after 2 and 3 gal. of virus suspensions, containing 2 and 20 million polyhedra/ml. respectively, were sprayed with a mist-blower placed at two positions to windward of a plantation. Over 94% mortality resulted 21 days after spraying 22 gal. of virus, containing 5 million polyhedra/ml. plus skim-milk powder as a sticker, from an aircraft over 50 acres of infested Scots Pine. Series of tests are described in which the aircraft flew along parallel lines 300 ft. apart, spraying virus suspensions containing 200,000, 1 and 5 million polyhedra/ml. *From author's summary.*

3846. BRUNS, H. Wann und in welchem Umfang wird die kleine Fichtenblattwespe (*Lygaeonematus abietum* Htg.) von der roten Waldameise (*Formica rufa*) eingetragen? **[When and to what extent is *L.* [*Pristiphora*] *abietum* collected for food by ants (*F. rufa*)?]** *Forstwiss. Cbl.* 73 (1/2), 1954 (35–40). [G.g.]

Field observations during an outbreak revealed that larvae of *L. abietum* formed a large proportion of the food collected by the small or medium red ant [*F. rufa rufopratensis*?], the highest point of consumption being reached towards the end of the larval feeding period. Previous contradictory evidence on these points may be explained by the fact that different forms of the ant behave differently, and the ants' collecting behaviour depends on the stage of development of the larvae, the weather, time of day and other factors. Throughout the 4-week feeding period of the larvae, one nest of ants, according to its size, may dispose of 100,000 to 1,000,000 larvae. The larvae were taken only in small quantities by the large red ant (*F. rufa rufa*) and only in isolated cases by the meadow ant (*F. rufa pratensis*).

3847. BECKWITH, L. C. **Larch sawfly conditions in the Lake States in 1953: a reconnaissance survey.** *Misc. Rep. Lake St. For. Exp. Sta.* No. 25, 1954. pp. 6 + 1 map.

3848. Wallace, D. R. **Some reactions of Larch trees to Larch sawfly defoliation.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (1), 1954 (2).

A study was made to establish a sampling technique for the Larch sawfly [*Pristiphora erichsonii*], based on the occurrence of curled shoots. In the course of this work, the following results were obtained: Both number of shoots and mean length of shoots decreased when the tree had suffered from sawfly feeding. When the trees had undergone only recent and light defoliation, the uncurled shoots were appreciably longer than the curled ones. Presumably oviposition caused this disturbance in shoot growth. In areas where sawfly attack had been prolonged and heavy, however, the curled shoots were longer than, or about the same length as the uncurled ones. Since oviposition would also be expected to cause a similar disturbance to shoot growth in the latter areas, it is indicated that Larch sawfly ♀s tend to select the longer shoots when seeking oviposition sites. The mean number of eggs/shoot tended to be lower in areas of old and severe infestation—probably a reflection of decreased shoot length. These results indicate that any sampling technique based on the presence of curled shoots must take into consideration the growth pattern of the Larch trees.

3849. Thalenhorst, W. Zur Kenntnis der Fichten-Blattwespen. II. Die Apparenzen der Nematini. **[Spruce sawflies. II. The appearance in time of the Nematini.]** *Z. PflKrankh.* 61 (4), 1954 (196–202). 10 refs. [G.e.] E.M.B.

[Cf. *For. Abstr.* 14 (No. 2498).] The appearance in time, first appearance and duration in 1951–53 of mature insects and larvae of *Pristiphora* spp., *Pachynematus* spp., and *Nematus insignis* are discussed and shown in graphs. There are characteristic differences between species and groups.

3850. Schread, J. C. **Birch leaf miner [*Fenusa pusilla*] control.** *Circ. Conn. agric. Exp. Sta.* No. 185, 1954. pp. 6.

Successful control has been obtained by spraying with 57% malathion or 25% lindane [γBHC] emulsion in the middle of May.

Diptera

See also Nos. 3228, 3743, 3746.

3851. Sasakawa (Tsujita), M., and Koyama, M. **Galls found on *Fagus crenata* Blume, with description of a new species (Dipt., Cecidomyidae).** *Scientific Reports, Saikyo University, Kyoto: Agriculture* No. 4, 1953 (4–8). 4 refs. [E.] P.R.

Describes 3 out of 4 types of cecidomyid galls on the leaves, and a new species (*Phegomyia tokunagai*, sp. nov.) obtained from one of these galls.

459. *Other Animals*

3852. **Red spiders in Western Europe [and Israel].** *FAO Plant Prot. Bull.* 2 (5), 1954 (71–4). 5 refs. I.M.I.

Discusses changes in incidence and their possible causes, and the control of (1) *Metatetranychus ulmi*, (2) *Tetranychus urticae*, (3) *Eotetranychus tiliarum* and (4) *Bryobia praetiosa*. Forest trees are among the host plants listed for (1) and (3).

46. DAMAGE TO TREE GROWTH BY MAN

See also No. 3569.

3853. Zentgraf, E. Über die Empfindlichkeit der Holzarten gegen Splitterschäden. **[The susceptibility of tree species to splinter damage [from shells, bombs etc.].]** *Allg. Forst- u. Jagdztg.* 123 (8), 1952 (223–4). [G.]

From the silvicultural point of view, the difficulty with moderately splinter-damaged stands is to decide whether the trees can be kept alive and the most severely damaged among them removed gradually. This depends mainly on their resistance to secondary, e.g. fungus, damage consequent upon the primary injury. In an attempt to throw some light on this question, 34 trees of Oak and Beech were felled in 4 stands, all over 60 years old, in the Saarlouis forest district. The damage was known to date from the 1939/40 winter. In these trees, which were chosen as representing an average degree of externally visible injury for the stands concerned, a mean of 20 splinters per stem was found. This figure does not include the doubtless numerous smaller wounds from bullets and splinters < 1 cm. in diam., which, though quickly occluded and causing no patches of decay, will certainly give trouble in conversion. In Oak, the large splinter wounds at first give rise to a discoloration (only in heartwood) advancing longitudinally at a mean of 21 (but varying from 2 to 50) cm. p.a. The rate of advance showed no correlation with wound size. This was followed by white rot, progressing in heartwood at a mean of 7 (2–20) cm. and in sapwood at 13 (3–25) cm. p.a. in the longitudinal direction. Progress in the tangential direction was very much slower, and radially its depth depended on that of the wound. Since penetration was not deep in Oak, the areas of decay took the form of long, narrow stripes, usually representing no danger to the life of the tree and mostly readily eliminated in conversion. In both Oak and Beech the decay area was surrounded by a dark zone 1–2 cm. wide, the zone of hyphal attack, but in Beech the discoloration progressed at 70 (16–120) and the white rot at 19 (4–50) cm. p.a. in the longitudinal plane. Decay following large splinter wounds in the latter species often extended sufficiently to give rise to wind breakage after 4–8 years, and the life of the tree must certainly be regarded as endangered by such wounds. Some supplementary observations [not detailed] were made on felled forest and park trees of 11 other deciduous and 6 coniferous species. Estimates of their susceptibility to decay after splinter injuries are given, using the more exact data gained for Oak and Beech as a standard of comparison, e.g. Birch is rated as 'more susceptible than Beech', Robinia and Hornbeam as 'less susceptible than Oak'.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

3854. Day, W. R. **Cambial injuries on the main stem of conifers.** *Rep. imp. For. Inst., Oxf. 1952/53*, 1954 (13–4).

In a narrow valley in Glentress Forest, 23% of trees (Norway and Sitka Spruce) sampled showed injuries, 6% being severely affected. First injuries occurred in summer but the main extension of the injuries occurred at the very beginning of the growing season when cambial division was just beginning. Indications are that the main cause of the injuries is non-parasitic.

3855. MURRAY, J. S. **Two diseases of Spruce under investigation in Great Britain**. *Forestry* 27 (1), 1954 (54–62 + 1 plate). 5 refs.

Descriptions are given of two apparently distinct diseases. One, termed 'group dying', occurs mostly in Sitka Spruce but sometimes in Norway Spruce, and is characterized by progressive death of the roots and a tendency for the trees to die in small groups in the stand. Trees between 20 and 30 years of age are usually attacked. The second disease is termed 'top dying' and is confined to Norway Spruce. There is a gradual loss of needles commencing usually in the upper crown and a reduction in height increment over a number of years. The roots and stem are the last portions of the tree to die. The symptoms are very similar to those of drought, but drought as a complete explanation is unsatisfactory. *From author's summary.*

3856. MURRAY, J. S. **Group dying of Spruce in Eire**. *Irish For.* 10 (2), 1953 (55–6).

Notes on several examples in Ireland of this disease, already under investigation in Great Britain and characterized by death of the root system accompanied by thinning of the crown, reduction in height increment, and usually heavy coning before death. [Cf. *For. Abstr.* 15 (No. 2717).]

3857. **[Dieback of Yellow Birch and mycorrhiza.]** *Rep. Sci. Serv. Dep. Agric. Can. 1952/53*, 1953 (11).

In the Maritime Provinces, strangulation of small Yellow Birch trees or portions of their root systems with wire was followed by the disappearance of mycorrhizae between the points of strangulation, the death of roots, and the appearance of saprophytic fungi, followed by symptoms of dieback in the foliage when large portions of the root system were affected. Several hundred seedlings have been inoculated with fungi isolated from living and dead roots of Yellow Birch to determine whether these fungi are capable of forming mycorrhizae or are merely saprophytic. Their activity is being related to variations in temperature.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

521. *Diameter (Girth) and Sectional Area*

See also Nos. 3862–4, 3873–4, 3926.

3858. CARL, C. M., and YOUNG, H. E. **Stump-DBH relationships for hardwoods in the vicinity of Bingham, Maine**. *Tech. Note Univ. Me. For. Dep.* No. 27, 1954. pp. 2.

Includes two tables: (1) giving stump diam. o.b. and d.b.h. and (2) giving stump diam. u.b. and d.b.h. (stump height = 1 ft.), for Sugar Maple, Red Maple, White Birch, Yellow Birch, and Birch [unspecified].

3859. HOTTA, Y., and MAEZAWA, K. **The error of basal area [as] affected by method of estimation**. *Bull. Tokyo Univ. For.* No. 46, 1954 (145–57). 9 refs. [E.e.jap.]

A statistical analysis of the various sources of error. Measurement by tape is recommended.

522. *Height, Length*

See also No. 3927.

3860. **Jal hypsometer**. *Equipm. Note, FAO* No. *A*.2.54, 1954. pp. 2.

Describes and illustrates a hypsometer made by Ellehammer's Laboratory, Hellerup, Denmark, which enables measurements to be made of the height of 40–50 trees/hr. with an average error of 0·3–0·5%.

3861. LØVENGREEN, J. A. Højdemaalere. Afprøvning af forskellige Højdemaalere udført af Statens forstlige Forsøgsvæsen. **[Hypsometers: tests of various instruments carried out by the Danish State Forest Experiment Station.]** *Dansk Skovforen. Tidsskr.* 37 (12), 1952 (590–601). [Dan.]

Reports on accuracy tests of the following hypsometers: (1) Christen's, (2) Faustmann's, (3) U.S. Forest Service, (4) 2-m. steel tape measure used as a hypsometer (A. E. Koch's method), (5) the author's own JAL [cf. preceding abstract]—(*a*) held in the hand and (*b*) mounted on a bipod with mechanical adjustment, and (6) the Abney level. These were tested in the hands of 4 observers differing in skill (i) under 'ideal' conditions—using a tape held against a chimney, for 5 groups of heights varying from 10 to 30 m., readings being taken from 7 distances (1·6–0·4 times the height) for each group; and (ii) in the forest, each method being tested on 9 trees, using either the results given by (5*b*) or measurements made after felling, as the standard heights. Results were analysed statistically and are given in a table and graphs, with the following broad conclusions: (1) Is suitable for heights up to 20 m., above which its scale is too small for reliable results; it demands much practice. (4) Is about as accurate as (1) and is quite suitable where reasonable approximations of tree height have to be obtained without an assistant; it also demands practice. (2) Tends to give underestimates, but very good results are obtainable with practice and checking against known heights. (3) Gives very good results, but involves calculation and is therefore slow; some doubt is expressed as to the efficacy of the stop mechanism. (6) Is excellent but not generally available in Denmark. (5*a*) Needs much practice, but is then quicker than, and about as accurate as (2), (3) and (6). (5*b*) is very accurate under all conditions and has been adopted by the Danish Forest Experiment Station; it is illustrated in two photos, with a description of its features and use.

524. *Determination of the Volume of Trees and Stands*

524.1. Principles of Volume Determination. Form (Taper)

See also Nos. 3897, 3901.

3862. Matsui, Z., and Baba, K. **[The basal-stem curve of Todo Fir [*Abies mayriana*] and Ezo Spruce [*Picea jezoensis*].]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (135–9). [Jap.e.]

Equations are given for calculating the curve from stump diameter and d.b.h.

3863. Setten, G. G. K. **[The height of buttress structure on Malayan trees.]** *Res. Pamphl. For. Res. Inst. Kepong* Nos. 7–11, 1954.

The pamphlets give preliminary data on the following species, the figures quoted referring respectively to the number of stems examined and the % of these having buttresses ⩾ 4 ft. 6 in. high: (7) Meranti Tembaga (*Shorea leprosula*) 432, 42% (pp. 6); (8) Meranti Sarang Punai (*Shorea parvifolia*) 921, 46% (pp. 5; 2 refs.); (9) Seraya (*Shorea curtisii*) 553, 21% (pp. 4; 3 refs.); (10) Kapur (*Dryobalanops aromatica*) 875, 55% (pp. 5; 4 refs.); (11) Kempas (*Koompassia malaccensis*) 665, 80% (pp. 5; 5 refs.).

3864. Setten, G. G. K. **The effect of situation on the height of buttress structure of trees of *Shorea parvifolia* Dyer, *Shorea leprosula* Miq., *Shorea curtisii* Dyer ex King, *Dryobalanops aromatica* Gaertn. f., and *Koompassia malaccensis* Maing. ex Benth.** *Res. Pamphl. For. Res. Inst. Kepong* No. 12, 1954. pp. 9. 4 refs.

It has been shown that height of buttress structure in each species varies from place to place in Malaya, but the factors involved have not been determined

524.3. Volume of Tree Groups and Stands

See also Nos. 3883–5, 3897, 3922.

3865. Dawkins, H. C. **The construction of commercial volume tables for tropical forest trees.** *Emp. For. Rev.* 33 (1), 1954 (61–70). 6 refs.

The best existing account of tropical-tree volume-table construction describes the application of various mathematical curves to fit the data. The fitting process is laborious and a quicker method was sought. It is known that tropical high-forest trees put on little timber height once near the mature girth-range, and that subsequent increment approximates to a simple increase in diameter. An inherent linear relation should therefore exist between √ volume and girth. This tendency is proved. The volume table may therefore be constructed by calculating the regression of √ volume on girth, testing the coefficient, and then squaring calculated √ volumes. Such a construction is described in detail, together with the Griffith tests that should be applied to the results. In the present case, where form heights approximate to a horizontal linear relation with girth, a special application to enumeration sampling is described. A selection of typical volume tables for Uganda timber trees is graphically compared. *Author's summary.*

3866. Emrović, B. O konstrukciji lokalnih jednoulaznih drvnogromadnih tablica (tarifa). **[The construction of local volume tables ('tariffs') based on d.b.h. only.]** *Šum. List* 77 (4/5), 1953 (214–21). 8 refs. [Croat.e.]

Discusses the construction of local volume 'tariffs' on the basis of standard height curves [cf. *For. Abstr.* 15 (No. 1632)] and local volume tables with d.b.h. and height as co-ordinates. For demonstration, 2355 heights were measured in 22 Pedunculate Oak stands in the Lipovljani forest and the results were used to deduce theoretical straight-line height curves passing through the origin so that if one further point is fixed—e.g. by d.b.h. and height of mean tree—the whole course of the curve is defined. For lack of local volume tables, Schwappach's tables were used to give for a single d.b.h. value (45 cm.) the 12 heights corresponding to trees having timber volumes varying from 1·60 to 2·70 cu.m. The values so obtained were fitted to straight-line height curves as above, and by combining the height values read from these curves with the other data from Schwappach's tables, the author constructs a local 'tariff' for each of the 12 height curves and gives two nomograms relating the 'tariffs' to d.b.h. and height of the mean tree, so as to enable the correct 'tariff' to be found (*a*) in terms of volume and (*b*) in terms of form factors.

3867. Grochowski, J. Ocena dokładności tablic miąższości Grundnera-Schwappacha i Laera na przykładzie drzewostanu sosnowego lasów rogowskich. **[Assessment of the accuracy of the volume tables of Grundner-Schwappach and von Laer, on the example of a Pine stand in the forests of Rogów.]** *Roczn. Nauk leśn.* 2, 1953 (3–46 + 2 tbls). 15 refs. [Pol.pol.russ.g.] (*Prace Inst. Bad. Leśn.* No. 103.)

Volume of stem and branch down to 7 cm. diam., was determined o.b., section by section, for each of 537 *Pinus sylvestris* stems felled in an almost pure stand, mean age 80 years (64–105 years, but 95% of the trees between 70 and 90 years), of varying (mainly moderate) density, on (Schwappach) site quality I. It was found that, when using Grundner-Schwappach's (G–S) table for age up to 80 years, the volume calculated was too small for ca. 30% and too great for ca. 70% of the stems. The average deviation (irrespective of sign) was 7·6%, the coefficient of variation ± 9·7% (for individual tree volumes). The mean of all deviations (with regard to sign) was + 4·9 (± 8·4) %. The accuracy of the table is fairly constant, for all diameter classes. It is suggested that all volume values in the G–S table for ages up to 80 years be reduced by 4·1% (this being the correction applicable to stand volume). When so corrected and applied to Pine stands of age class IV/V in Poland, average deviation is reduced from 7·6 to 6·4%, the coefficient of variation from ± 9·7 to ± 8·0%, the number of positive and negative deviations being almost equal. For the G–S table applied to stands older than 80 years, the errors are greater still. It is suggested that for this age class the uncorrected G–S table for stands up to 80 years should be used. It was found that von Laer's tables gave excessively high results for all diameter classes, the error increasing with diameter and also slightly with height.

3868. MIRABOĞLU, M. Göknar hacım tabolarι. **[Stemwood volume tables for Fir.]** *Istanbul Üniv. Orm. Fak. Derg.* 3*A* (1/2), 1953 (99–118). 42 refs. [Turk.g.]

Presents a composite table for *Abies bornmülleriana* and *A. nordmanniana* and a separate table for *A. cilicica.* [Cf. *For. Abstr.* 13 (No. 4077).]

3869. **Tree-volume tables based on forest site: Adirondack and Catskill regions of New York State.** *Bull. N.Y. St. Coll. For.* No. 29, 1953. pp. 8.

Gives bd. ft. volume International ¼-in. rule and cu. ft. vol. by 1-inch diameter gradations for White Pine, Red Pine, Red Spruce, Balsam Fir, Hemlock, Black Cherry, White Ash, Basswood, Hard Maple, Beech, Oaks, Aspen, and Birch for 3 site qualities, and also for swamp species.

3870. DEMERITT, D. B. **Second-growth White Pine volume table—Southwestern Maine.** *Tech. Note Univ. Me. For. Dep.* No. 18, 1952. pp. 5.

Gives (1) volume in bd. ft. Maine rule, (2) ditto International ¼-in rule, (3) ditto Scribner rule, (4) volume in cu. ft., (5) volume in cords, by 10-ft. height classes.

3871. CARL, C. M., and YOUNG, H. E. **Form class volume tables for estimating board foot content of northern conifers—Maine log rule.** *Tech. Note Univ. Me. For. Dep.* No. 22, 1953. pp. 4.

3872. LUDVIGSEN, F. P. Taksasjon uten klave. **[Stand measurements without calipers.]** *Tidsskr. Skogbr.* 62 (3), 1954 (121–31). [Nor.]

Analyses the results of investigations on the relationship in 214 forests between actual volume in the different felling classes [cf. *For. Abstr.* 13 (No. 2358)] and the normal volume from yield tables, the effect as found in 691 forests of felling-class distribution on volume and increment, and the relationship of density to volume and increment as shown by strip and plot surveys in 19 forests. Concludes that for determining stand volume from tables, information on area, quality class, felling-class distribution and stand density gives sufficiently accurate results without need for direct tree measurement, but that to give the same degree of accuracy in determining increment, some systematic measurements of increment are needed in addition. The results are of particular value for small farm forests.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

See also No. 4410.

3873. SHANKS, R. E. **Plotless sampling trials in Appalachian forest types.** *Ecology* 35 (2), 1954 (237–44). 21 refs.

Two methods of plotless sampling, (*a*) Bitterlich's 'Winkelzahl' method, and (*b*) the use of random pairs were compared with each other and with (*c*) conventional plot sampling in Spruce/Fir and mixed broadleaved stands. Both (*a*) and (*b*) were superior to (*c*) in yield of information/man-hour; (*a*) was superior to (*b*) for the types sampled, but a method based on random pairs might be superior for certain kinds of study of stand structure.

3874. SHANKS, R. E. **Biased forest stand estimates due to sample size.** *Science* 118 (3077), 1953 (750–1). 4 refs. (*Contribution from the Botanical Laboratory, University of Tennessee (n.s.)* No. 154.) O.R.S.

The tendency to use small samples in forest sampling for ecological purposes is discussed. Results of plotting on probability paper cumulative distributions of sample basal-area values for tenth-acre, fortieth-acre and random-pair samples taken at the same random points in a Spruce/Fir stand showed that conventional statistical treatment of small samples (one-fortieth acre or less) yields biased estimates, at least in the Appalachian vegetation. In the examples cited, this bias was reduced or eliminated by a logarithmic transformation that allows the use of standard procedures with small sample data.

525. *Volume by Assortments. Merchantable Volume*

See also Nos. 3735–6, 3922, 3926, 3952

3875. SILVERBORG, S. B. **Northern hardwoods cull manual.** *Bull. N.Y. St. Coll. For.* No. 31, 1954. pp. 45. Price 75 cents.

Contains 20 photographs of fungus fructifications, cankers, bulges etc. with facing notes describing them and the amount of cull due to heartrot to be deduced from the visible signs.

526. *Log Measurement. Scaling*

3876. BØRSET, O. Undersøkelser over ospetømmer. **[Investigation on Aspen logs.]** *Medd. norske Skogforsøksv.* 11 (2) (No. 39), 1952 (355–423). 10 refs. [Nor.nor.e.]

Investigations were made on 1482 logs (1072 butt and 410 top logs). Results include the following: (1) *Calculation of volume*: Different methods are compared, using measurement by 1-m. sections as the standard. Volume obtained from mid-diameter of butt logs gave an underestimate of 3·0% o.b. and 2·5% u.b. These figures are similar to those previously found for Spruce and Pine in S. Norway. No correlation was found between error and log diameter but the error appeared to decrease with decreasing log length. The corresponding errors for top logs were 2·5 and 2·1%. The volume obtained by using the shortest mid-diameter is 8% lower than that from the mean mid-diameter; excentricity of Aspen logs is therefore greater than that of conifers, in which the difference is only 4·5%. (2) *Bark thickness and bark volume*: Double bark thickness of all logs averaged 17·4, of butt logs 18·3 and of top logs 15·1 mm. Bark thickness was very little affected by log length, but there was a slight negative correlation between log length and bark thickness for butt logs. Bark thickness increases with increasing diameter, and decreases with increasing height from the stump. A formula is given for computing bark % from bark thickness and diam. o.b. (3) *Log excentricity*: Average excentricity (½ the difference between long and short mid-diameters) for the whole material was 1·01 cm. No difference was found between excentricity over and under bark. A tendency to an increase in excentricity with increasing diameter was found but the correlation was small. Relative excentricity (excentricity expressed in % of mid-diameter) was almost independent of diameter. (4) *Taper*: Average taper for all logs was 9·2 and for butt logs 9·0 mm./m., figures rather below those for conifers. The correlation between taper and diameter was very low. (5) Tables are presented for calculating volume from top diameter and length. There is a full English summary and results are given in graphs and tables with English legends.

527. *Solid Volume of Stacked Products*

3877. Grove, E. R. **Influence of silvicultural practice and species on the solid wood contents of peeled, stacked pulpwood.** *Tech. Note Univ. Me. For. Dep.* No. 9, 1951. pp. 2. 1 ref.

An investigation of the possible effect of (*a*) cutting practice (degree of selection) and (*b*) species, on the solid wood content of stacked pulpwood, gave no consistent difference for (*a*), and slight but not statistically significant differences for (*b*).

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

See also Nos. 3362, 3560.

3878. Loetsch, F. Die Bedeutung des Merkmals 'Kronengüteklasse' bei Holzvorrats- und Zuwachsinventuren. [**[The value of classification into 'crown quality classes' in growing stock and increment inventories.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 25 (No. 7), 1953. pp. 7. [G.] Limited distribution.

[Cf. *For. Abstr.* 14 (No. 1447).] Measurements were made on 1755 Pine and 697 Spruce, and the trees were grouped by age and diameter, and into 3 crown quality classes based on crown form and crown ratio. Results will be discussed in more detail elsewhere. Tabulated results for Pine show that, within the age and diameter classes, the relationship in b.a. increment of the crown classes A : B : C is constant. Further experiments in sample plots in a central European Pine stand, show considerable differences in volume increment, according to the proportion of the different crown classes present.

3879. Toda, R. **[A method of indicating the degree of crown slenderness of individual trees. A pilot survey on *Pinus densiflora* in Kirisima area, S. Kyushu.]** *J. Jap. For. Soc.* 35 (12), 1953 (385–8). 4 refs. [Jap.e.]

A formula, $\log S = K_s + 0{\cdot}803 \log D$, (where S = crown diameter in m., D = d.b.h. in cm., and K_s is a constant representing the degree of crown slenderness) was derived from Reineke's formula for stand density and tested for its application to individual trees by measurements on 40 trees each from a 35- and a 200-year-old stand. Results showed that this derived formula can be used for individuals. A numerical value, K'_s representing the degree of crown slenderness of individuals is proposed, with the formula $K'_s/100 = \log S – 0{\cdot}803 (\log D – 1)$. The values obtained for the area examined were 20–48, average 33·1. [Results are shown in graphs with English legends.] *From author's summary.*

3880. Toda, R. **[A method of indicating the degree of crown slenderness of individual trees. II. Results from 'Kumotoosi', a clone of *Cryptomeria japonica*, and *Pinus densiflora* in the so-called 'Hyuuga Pine' area.]** *J. Jap. For. Soc.* 36 (5), 1954 (123–7). 1 ref. [Jap.e.]

The formula (developed from that of Reineke) used to determine crown form, $K'_s/100 = \log S - 0{\cdot}803 (\log D - 1)$ [cf. preceding abstract] could not be applied to a clone of *Cryptomeria japonica*, and a new coefficient 0·51 was calculated for log D, to supplement 0·803 in the formula. This disagreement may suggest that there is no universal coefficient among tree species or races. However a survey on Hyuuga Pine, a local race of *P. densiflora* showed that the new coefficient was more applicable than the old one. *From author's summary.*

3881. Yamaoka, Y. **[Measurement of the total transpiration from a forest.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 54, 1952 (187–206). Many refs. [E.jap.]

After preliminary investigations revealing correlations between leaf area (A) and stem sectional area, at successive levels up a tree (specific constants k being derived) and further correlations between these constants and stem/succeeding branches dimensional ratios, an equation

$$A = F(a, c_e).S$$

was developed, where F = a constant ascertainable for each species, a is the value of the stem/succeeding branches girth ratio, found to be $\frac{1}{6}$ and $\frac{1}{12}$ for broad-leaved and coniferous spp. respectively, c_e is the experimentally determined value of the stem/succeeding branches sectional area ratio and S is stem sectional area.

A correlation was next established between A and S_c (sectional area 'just below crown') and thence between A and d.b.h. (d_{bh}) of the form

$$A = \frac{k}{m^2}\cdot\frac{\pi}{4} d_{bh}^2$$

where k is the specific constant related to leaf area and m a general constant related to diameter and therefore

$$\Sigma A = \frac{k}{m^2}\cdot\frac{\pi}{4} \Sigma d_{bh}^2$$

To simplify field work in pure, more or less even-aged crops an ultimate expression was developed [the steps being shown]

$$\Sigma A = \frac{k}{m^2}\cdot\frac{\pi}{4} N (d_m^2 + \sigma^2)$$

where N = the number of stems in the stand, d_m is mean diameter and σ the standard deviation.

A test with 913 even-aged *Cryptomeria japonica* trees in a stand gave a discrepancy of only 0·05% between actual and calculated results.

3882. MARUYAMA, I., and SATO, T. **[The estimation of the amount of foliage in trees and stands (Report 1). Akamatsu in the Iwate district.]** *Bull. For. Exp. Sta. Meguro, Tokyo* No. 65, 1953 (1–10). 6 refs. [Jap.jap.e.]

Measurements were made in autumn 1951 and spring 1952 on, respectively, 24 and 14 trees of *Pinus densiflora* ranging from 5 to 40 years. Results are given in tables with English legends, showing area shaded, stem weight, branch weight, green leaf weight [W], W/unit area shaded, stem weight, branch air-dry [*a.d.*] weight/W, oven-dry [*o.d.*] weight/*a.d.* weight, *o.d.* weight/W, average leaf weight and number of leaves. W in kg. can be represented by the formula $\log W = 1{\cdot}61 \log D - 0{\cdot}89$ where D = d.b.h. in cm. W is a function of stem weight or branch weight. *A.d.* leaf weight and *o.d.* leaf weight are 45 and 42% respectively of W. The sample trees had rather greater crown lengths than those given in yield tables, so their W values would be rather high. W for a stand is calculated from the above formula and yield-table density values. W/ha. from the entire sample (spring and autumn measurements) is about 12 tons in a 40-year stand. Assuming the trees lose $\frac{1}{3}$ of the total leaf weight annually, annual leaf production/ha = 4 tons. W per unit area shaded appears to increase with tree age.

3883. WECK, J. Untersuchung über Brauchbarkeit und Genauigkeit eines Verfahrens der Bestandesmessung unter Verwendung von Stammabständen. **[An investigation of the utility and accuracy of a method of stand measurement based on mean spacing of trees.]** *Forstarchiv* 24 (11/12), 1953 (257–60). [G.g.]

The accuracy claimed for Köhler's method of finding mean tree-spacing (in m.) E and hence the number of trees/ha.

$$\left(= \frac{10{,}000}{E^2}\right)$$

from measurements for 50 individual trees in a stand [cf. *For. Abstr.* 14 (No. 1401), where the original symbol a is used] was surprising enough to call for the empirical verification given in this paper. Three regular stands in the Sachsenwald were completely enumerated and the mean distance of each tree from its second- and third-nearest neighbours was recorded. The stands, typical of many production forests in Central Europe, were: (1) pure 80-year Spruce; (2) pure Beech in an advanced stage of regeneration fellings under the uniform system, 160–180 years old; and (3) mixed forest of 100-year Pine with a second storey of 60- to 100-year Beech. Preliminary computation of E on the basis of the total population in each stand, gave values differing by < 1% from the quotient area/number of trees. The % standard error of E is worked out for numbers of randomly selected trees varying from 25 to 200 per stand (1·0–2·25 ha.); for 50 trees the values found are 1·8% for (1), 1·9% for (2), and 2·5% for Beech and 2·8% for Pine in (3)—the measurements in this case relating to 50 trees in each storey separately (mean spacing from Beech to Beech and from Pine to Pine). As a further check, the data for each population (stand or storey) were randomly divided into groups containing equal numbers of trees: E is found for each group, and its % deviations from the E values for the complete populations are tabulated. Determinations of E from one sample plot each in (1) and each storey of (3), containing the same number of trees as the groups mentioned above, gave much greater errors than those obtained with 50 randomly distributed trees. The method thus enables representative data to be collected for individual stands without full enumeration and measurement of the area. Its possibilities for comparative purposes, including the relative utilization of growing space by different elements in a stand, are briefly outlined and the need for further checks under a wider range of conditions is urged. The paper also includes data on the d.b.h.'s of the b.a. mean tree and the 2 Hohenadl mean trees for the partial and entire populations analysed, as well as figures for the standard error of mean annual-ring breadth for the last 10 years in the Pine overstorey of (3), based on increment cores from 100 trees of all diam. classes, and for the height dispersion of these trees.

3884. WECK, J. Schnellverfahren zur Ermittlung von Holzvorrat und Zuwachs in Einzelbeständen der gemässigten Zone. **[A rapid method of determining growing stock and increment of individual stands in the temperate zone.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 25 (No. 9), 1953. pp. 5 + 2 gphs. 8 refs. [G.] Limited distribution.

The method is applied in a fairly uniform stand as follows: (1) a number of trees, a (at least 50) lying on the longest diagonal of the stand, are calipered in 1-cm. gradations and the distances E_2 and E_3 to the second- and third-nearest trees in cm. (centre to centre of the trees) are measured [cf. *For. Abstr.* 14 (No. 1401)]. Marginal trees and any obviously abnormal trees are omitted. (2) The arithmetic mean, E, of all measured E_2 and E_3 values, expressed in m., is the mean spacing; E^2 is the mean growing space in sq. m.; and $\frac{10{,}000}{E^2}$ is the number of trees/ha., A; (3) The d.b.h. data for a are used to calculate the diameters of the two (+ and −) Hohenadl mean trees, found by counting to 16% of the total number of trees (i) from the largest and (ii) from the smallest d.b.h. value represented. The stand basal area is found from the mean b.a. of the sample trees multiplied by A. (4) Two increment cores are taken from each of Z trees selected by appearance as typical (especially in diameter, height, dimension and density of the green crown) of the diameter classes that include the + and − trees. The b.a. increment of each sample tree is obtained from the calipering data and the increment-core measurements. From these b.a.-increment values, Δg, taken separately for + and − sample trees, the b.a. increment % of the stand is found as

$$p = \frac{\Sigma\Delta g_{+} + \Sigma\Delta g_{-}}{\Sigma g_{+} + \Sigma g_{-}} \times 100$$

Trials in even-aged pure stands of different ages and several site classes and stand densities and in some regular 2-storeyed stands, suggest that measurements of 50 sample trees give sufficiently accurate results. Further experiments are needed on virgin and mixed selection forests. Before the increment figures obtained can be used in the compilation of tables, a reduction factor must be used to eliminate the effects of weather: this is obtained by comparing the curve obtained by growth laws [cf. *For. Abstr.* 14 (Nos. 1420–1)] with actual figures obtained by measurements for + and − mean trees over a considerable period, e.g. from long increment cores.

3885. Giurgiu, V. Noi metode de a determina indicele de suprafată de bază si volumul la hectar. **[New methods of determining basal-area index [= real b.a./normal b.a.] and volume/ha.]** *Rev. Pădurilor* 69 (3), 1954 (127–32). [Rum.]

Provides: (1) a table showing mean b.a. and volume in cu.m./ha. by 1-cm. gradations (d.b.h. 10–35 cm.) for *Quercus robur*, *Q. sessiliflora*, *Q. cerris*, *Carpinus betulus*, *Tilia* sp., *Salix* spp. (in plantations), and *Picea abies*; (2) a nomogram from which to read volume in cu.m./ha. for the same species, given (*a*) mean height and (*b*) stand density (in % of normal b.a.); (3) a table comparing volume, for typical trees of each of the above species, as obtained from (i) the nomogram, (ii) yield tables, and (iii) volume tables; (4) a formula for calculating real basal area:

$$\Sigma g_r = \gamma . N = \frac{\pi d^2}{4} \cdot \frac{10{,}000}{R^2}$$

when γ = mean tree b.a. (sq. m.), N = number of trees/ha., d = mean diameter (cm.), and R = mean distance between trees (m.); and (5) a nomogram for determining stand density (for the same species), given mean diameter, mean height, and distance between trees.

54. ASSESSMENT OF SITE QUALITY

See also Nos. 3183, 3185, 3341, 3950.

3886. Mount, P., and Gove, W. **Site index for Spruce-Fir stands based on age at breast height and total height.** *Tech. Note Univ. Me. For. Dep.* No. 13, 1952. pp. 3.

Examination of sample trees from 16 plots showed that there is great variation in the time taken to reach breast height—from 3 to 31 years for Spruce and from 4 to 15 years for Fir [*Abies balsamea*], Spruce requiring on an average 5 years more than Fir. The effect of this variation on calculation of site index from total age and total height is discussed, and a method of using age at breast height is explained.

3887. Mount, P., Covell, M. R., and Young, H. E. **Physical properties of forest soil as related to the site index of Spruce—a progress report.** *Tech. Note Univ. Me. For. Dep.* No. 16, 1952. pp. 2.

Analysis of data from 14 plots indicated that the total depth of the A (*a*) and B (*b*) horizons, the % of stones in the C horizon (*c*), and the imbibitional water value of the A horizon (*d*) were 4 independent variables with possibilities in a multiple regression equation. These were subjected to regression analysis and it was found that the site index of Spruce decreased as (*a*) and (*d*) increased. In equation form this appears as: Spruce site index = 54·29 − 1·14 *a* − 0·78 *d*, where *a* = total depth of A horizon in inches, and *d* = imbibitional water value of A horizon. [Cf. *For. Abstr.* 15 (No. 1652).]

3888. Young, H. E., Struchtemeyer, R. A., Arsenault, R. W., and Merchant, G. **Physical properties of forest soils as related to the site index of White Pine.** *Tech. Note Univ. Me. For. Dep.* No. 2, 1950. pp. 2.

Regression analysis of available data for *Pinus strobus* sites in Maine showed that as the site index decreased, the depth of A horizon (including litter) and the % of stones in the B horizon increased. In equation form this appears as: Site Index = 65·01 − 2·95 (depth of A horizon in in.) − 0·15 (% stones in B horizon).

3889. Smith, D. B. H., Jr., and Colson, W. I., Jr. **A field check of the existing White Pine soil/site index equation.** *Tech. Note Univ. Me. For. Dep.* No. 7, 1951. pp. 2.

In the 30 stands studied, the difference between the actual site index and the equation site index [cf. preceding abstract] exceeded 5 ft. in 7 stands, and was 5 ft. or less in the remainder.

3890. McClurkin, D. C. **Soil and climatic factors related to the growth of Longleaf Pine.** *Occ. Pap. Sth. For. Exp. Sta.* No. 132, 1953. pp. 12. 6 refs.

Measurements were made on sample plots in 145 stands ranging from Mississippi to E. Texas. Data on soils, position on slopes, % slope, class of surface drainage, aspect and rainfall were analysed statistically. The Jan.–June rainfall was more important than any other single variable, and depth to the least permeable horizon was the most significant of the soil factors. A table is given for determining site index from these two factors.

3891. Mogren, E. W. **Comparison of growth rate of three species of Pine on two soil classes on the Lake Vadnais plantation, Minnesota.** *J. For.* 52 (5), 1954 (359–60).

Neither height nor diameter growth of *Pinus banksiana* differed significantly with soil, whereas both varied significantly with soil in *P. strobus* and only diam. growth in *P. resinosa*.

3892. Botvay, K. Adatok az alföldi akácállományok minösége és a talajvíz mélysége közötti kapcsolathoz. **[Relationship between the quality of *Robinia pseudoacacia* stands and the water table in the Hungarian Plain.]** *Erdömérnöki Föiskola Évkönyve Sopron 1951/52, Budapest*, 1953 (3–16). 15 refs. [Hung.russ.g.]

Investigations on 30 experimental plots in 6 different areas show some correlation (correlation coefficient $r = -0{\cdot}471$) between the development of *R. pseudoacacia* stands and the depth of water table. The optimum depth was found to be ca. 3 m.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 3293, 3326, 3330, 3362, 3410, 3429, 3436, 3531–3, 3551, 3554, 3562–4, 3567, 3573–7, 3585, 3596, 3763.

3893. Harrison, J. D. B. **Summary of growth and yield studies (prepared by Forest Research Division—Forestry Branch of Canada).** [*Pre-issue*] *Proc. Cong. int. Union For. Res. Organ., Rome, 1953*, Section 25 (No. 4), 1953. pp. 9. 16 refs. [E.e.] Limited distribution.

3894. Mitscherlich, G. Über die Schwierigkeiten bei der Zusammenfassung ertragskundlicher Versuchsergebnisse bei der Berücksichtigung der Wuchsgebiete. **[Difficulties in the compilation of data from increment and yield studies with regard to growth regions.]** *Allg. Forst- u Jagdztg.* 124 (5), 1953 (125–31). [G.g.e.] [Badische Forstliche Versuchsanstalt.]

A lecture stressing the need for considering the effects of climate upon growth when evaluating sample-plot data from extensive regions, with some examples of variation in factors such as tree number, b.a., and diameter, b.a. and volume increment in Germany, both horizontally from S.W. to N.E. and vertically with altitude. Such differences are very small for Beech, larger but still tolerable for Scots Pine, and so considerable in Norway Spruce that they must always be taken into account.

3895. Sevim, M. Lübnan sedirinde yapılan bir kaç gövde analizi ve sonuçları. **[Growth of Cedar of Lebanon.]** *Istanbul Üniv. Orm. Fak. Derg.* 3*A* (1/2), 1953 (48–53 + 1 dgm. + 4 tbls.). [Turk.e.]

Stem analyses were made on 14 Cedars (two exceeding 200 years old) and 2 Firs from the Taurus region, the results being presented in tables. The period of most rapid height growth appears to be between 10 and 20–50 years. *From author's summary.*

3896. Yoshida, M., and Hirata, T. **[Comparison of the growth of *Cryptomeria japonica* and *Chamaecyparis obtusa* planted in alternate rows. (IV).]** *Bull. Tokyo Univ. For.* No. 46, 1954 (97–114). [Jap.jap.e.]

A continuing study. Measurements are compared with those made in 1942. In the stand as a whole the relative proportion of Sugi (*C. japonica*) to Hinoki (*C. obtusa*) was 54/46, as in 1942. The average diameter, diam. increment and b.a. of Hinoki were below those for Sugi and relatively lower than in 1942. On lower quality sites, diam. and b.a. were above those for Sugi. The standard deviation of diam. and b.a. was lower for Hinoki than Sugi. Similar results were obtained on sample plots.

3897. Badoux, E. Notes sur la production du mélèze. **[Notes on the yield of European Larch.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 28, 1952 (209–70). 55 refs. [G.g.f.]

From data of ca. 30 plots measured since 1919 and 3228 stems, timber volume tables are given with single entry (diam.) separately for stems growing above (subalpine conditions) and below 1100 m. and with double entry (diam. and ht.) for general and more accurate application. Stem form (apart from the butt) resembles that of other conifers, lowland Larch assuming a place intermediate between the high mountain type and Spruce. Bark volume % is much higher than in the principal forest species, including Scots Pine, being ca. 25 in the mountains and 19% in the lowlands. Measurements of diam. increment from discs show that attacks by *Semasia diniana* (lasting 2–3 years with free intervals of ca. 5–7 years) depress production by about 30% for each year of attack. Data are given of stand volumes and increment for Larch in various localities in the Engadine, Haut-Valais etc., in the *Piceetum subalpinum*, in the Silver Fir range, and in mixture in Oak and in Beech forests.

3898. Kaufman, C. M., White, J. B., and Monroe, R. J. **Growth of Pond Pine in a pocosin area.** *J. For.* 52 (4), 1954 (275–9). 14. refs.

Data are presented on height, d.b.h., rate of b.a. increment, double bark thickness and Girard form class for 318 *Pinus serotina* trees, 10–106 years old, growing in soil subjected to periodical waterlogging and intermittent burning.

3899. Miller, W. D. **Pine or hardwoods. A comparison of the growth rates of Loblolly and Virginia Pines and upland hardwoods in the Piedmont of North Carolina.** *Sth. Lumberm.* 188 (2355), 1954 (32–4). 12 refs.

On 9 plots (3 each of the Pines and 3 of upland hardwoods) volume increment on the Pine plots was two–three times as high as that on the hardwood plots.

3900. Echeverria, I. Production normale actuelle des forêts espagnoles d'essences de croissance rapide. **[Present normal yield in Spanish forests of quick-growing species.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 25 (No. 18), 1953. pp. 4. [F.] [A Spanish version of this paper is given as Section 25 (No. 12).] Limited distribution.

Yield tables have been or are being prepared for *Pinus radiata* in N. Spain, *P. pinaster* in Galicia, and *Eucalyptus globulus* on the south coast and in N. Spain. Treatments established as desirable for the two Pine species for mine timbers are: thinning every 3 years, pruning, and a rotation of 18–30 years for *P. radiata* and 25–35 for *P. pinaster*. Optimum stand densities have been determined. Data so far for *E. globulus* indicate that quite different results are obtained in the north and south. The actual yield of these species is lower than could be obtained if the results of these experiments on desirable treatments as regards stand density, thinning and pruning were applied.

3901. Groos, R. Der Eichen-Ausschlagwald (eine ertragskundliche Untersuchung). **[Oak stands from coppice allowed to grow on as high forest (a study of increment and yield).]** *Allg. Forst- u. Jagdztg.* 124 (7), 1953 (189–208). 20 refs. [G.g.e.] [Institut für Forsteinrichtung und Ertragskunde, Hann. Münden.]

A much abbreviated version of an unpublished work. Many Oak coppice stands in W. Germany, managed up to the end of the 19th century on a

20-year rotation for tanbark and fuelwood, were later allowed to grow on as high forest when competition from synthetic tanstuffs rendered tanbark production less profitable. The present paper gives the results of a mensurational study of such stands, covering 91 normally stocked, pure, even-aged Oak plots of various ages in the north-eastern Taunus, subjected to fellings considered to represent moderate low thinning. The results are discussed under the heads: normal course of growth, illustrated by a yield table (reproduced in part and available in full from the author); timber quality (straightness of stem, branchiness, development of epicormics); and stem form. For the first 70 years or so, these stands (*a*) surpass those of seedling origin (*b*) in height and volume increment, the intersection of their volume m.a.i. and c.a.i. curves occurring at 85 years —i.e. 20–30 years earlier than for (*b*). At 100 years, however, their m.a.i. averages ca. 10% less than that of (*b*). Thinning yields begin earlier, but from 50 years onward are lower, owing to the smaller number of trees/ha. Timber quality equals that of (*b*) only where the density of the stools of the former crop is high and tending has been correct (moderate low thinnings). Differences in stem form and taper were in general unimportant. It is concluded that fully stocked pure Oak of coppice origin, if of good to very good timber quality, should be managed as high forest on a rotation of 140 years or more. To prevent crookedness and coarse branching, young stands should be thinned more lightly than young stands of (*b*). Later, they may be underplanted with Beech. If the stands are of medium to poor quality, but fully stocked and pure, they may be clear-felled at 70–75 years and a suitable species planted; or on good Oak sites it may be possible to obtain natural regeneration under shelterwood. Understocked, branchy stands with an admixture of inferior species should be clear-felled at 20–30 years (after the culmination of c.a.i.) and replanted with some suitable species.

3902. NISTOR, I. Contribuţii la cunoaşterea stejarului tardiflor (*Quercus robur* var. *tardiflora* Czen.). **[Identification and increment of *Q. robur* var. *tardiflora*.]** *Rev. Pădurilor* 69 (1; 2), 1954 (8–14; 16–8). [Rum.rum.]

3903. VIHROV, V. E., and ENJKOVA, E. I. Dinamika vegetacionnogo prirosta drevesiny rano- i pozdnoraspuskajuščihsja form duba v svjazi s uslovijami proizrastanija. **[The dynamics of wood increment in early- and late-flushing forms of Oak as related to growth conditions.]** *Trud. Inst. Les.* 9, 1953 (5–28). 18 refs. [Russ.]

Presents results of observations made in 1949 on 16 Oak trees (*Quercus robur*, 10 of var. *praecox* (1) and 6 of var. *tardiflora* (2)) in typical 60-year-old and 160-year-old stands on dark-grey clay-loam (*a*), solonets soils (*b*), and floodlands (*c*) of the Khoper River. The growth increment was measured periodically under a microscope on superficial wood samples from the periphery. For either variety, the formation of wood by the cambium began 3–7 days before the opening of the leaf buds. For (1), the increment on (*b*) was only 50–55% of that on (*a*); for (2), it was 25–30%. The rate of growth of Oak on (*c*) was 15% less than on (*a*). While wood formation began 10–20 days earlier in (1), it ended simultaneously for both. Variety (1) is more resistant to unfavourable growth conditions. In early spring, the maximum current increment was observed on (*b*), but later the maximum passed to (*a*). In favourable conditions both varieties give identical increment; in unfavourable (solonets soil), (1) is more advantageous.

3904. MATSUI, Z., and MOORI, K. **[The growth of secondary Birch stands in Kushiro experiment forest.]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (159–66). [Jap.e.]

Gives details of growth for *Betula tauschii* and *B. ermanii.*

3905. MATSUI, Z., and YOKOYAMA, C. **[The growth of plantations of Sawagurumi (*Pterocarya rhoifolia*) in the Shiraoi and Nopporo districts.]** In *Symposium, Annual Staff Conference, Sapporo Branch, Government Forest Experiment Station, 1952*, 1953 (140–5). [Jap.e.]

Details of growth for stands 29 and 30 years old on two soil types are given in tables with English legends.

3906. **[Increment of *Simaruba amara* plantations in Trinidad.]** *Rep. For. Dep. Trin. Tob. 1952*, 1954 (15).

A ½-acre sample plot of 8½-year-old *S. amara*, originally sown at stake, was measured. The 234 trees/acre had a volume of 1230 cu. ft., and c.a.i. was 394 cu. ft./acre.

3907. ARDIKOESOEMA, R. I., and SOEDIBJA, R. S. Beberapa keterangan mengenai tanaman baros (*Manglietia glauca* Bl.). **[Some notes on *M. glauca* in plantations.]** *Repr.* from *Rimba Indonesia* 2 (10/12), 1953 (387–97 + 2 photos). 7 refs. [Jav.e.] (*Commun. For. Res. Inst., Bogor* No. 40, 1953).

M. glauca, one of the most valuable timber species in Indonesia, grows only at heights of 700 m. or above, and needs a humid climate and fertile soil. Results [given in graphs with English legends] from 9 sample plots established by the Forest Research Institute show that the tree can reach a height of 7·8 m., and diam. of 10 cm. in 5 years. Differences between these figures and earlier ones (4–6m. height, diam. 6 cm. in 5 years) are probably caused by site differences. If the sample-plot results correspond with the average site class, growth is comparable with that of Teak on site class III. In pure stands all trees show dry tops, but it is not yet certain whether results will be better in mixed stands. Two plots in which *M. glauca* was planted in mixture with *Altingia excelsa* and *Acacia decurrens* also showed dry tops. *From authors' summary.*

3908. ROSS, J. K. **Yield of poles and fuelwood from Olokemeji reserve plantations (10 years rotation —coppice regeneration [mainly Teak].).** *Inform. Bull. For. Dep. Nigeria* No. 14, 1954 (2–3).

561. *Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology*

See also Nos. 3250, 3883–4.

3909. Ferguson, J. H. A. **Considerations on the computation of diameter growth by diameter classes, from stand tables.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 25 (No. 2), 1953. pp. 9. 6 refs. [E.e.] Limited distribution.

[Cf. *For. Abstr.* 14 (No. 1426).] The results of determining increment using Prodan's method, either (*a*) from individual tree diameter records or (*b*) from stand tables, are compared for *Agathis loranthifolia*, Teak, and *Pinus merkusii*. A systematic error is made by (*b*), more important for the tolerant species *A. loranthifolia* than for the light-demanders, and considerable in the plot with young unthinned Pine. Method (*a*), based on permanent sample plot data, is to be preferred.

3910. Larson, P. R. **Labelling and storing increment cores.** *J. For.* 52 (4), 1954 (252).

The labelling and storage of increment cores is facilitated by placing each core, immediately after extraction, in a paper drinking straw and pinching the edges close. The necessary data can then be written on the outside of the straw, with either a lead pencil or a wax pencil.

3911. Hosoi, M., and Manabe, T. **[A method of micro-measurement of stem diameter growth (measurement of current daily increment of *Paulownia*).]** *J. Jap. For. Soc.* 36 (2), 1954 (54–6). [Jap.e.]

Measurements were made on a standing tree of *P. tomentosa* 7 m. high and 16 cm. d.b.h., using a dial gauge with $\frac{1}{100}$-mm. scale. Results [shown in graphs and tables with English legends] show an annual radial increment of 25 mm., beginning with the opening of the buds and ending with leaf fall. Maximum daily increment exceeded 0·4 mm. in July. Increment fluctuated from day to day; 2-hourly measurements showed a maximum in the afternoon.

3912. Koelmeyer, K. O. **A study of the girth increment of *Dipterocarpus zeylanicus* (Hora).** *Ceylon Forester* (*n.s.*) 1 (3), 1953 (76–82). 5 refs.

3913. Ermich, K., and Mergentaler, J. Zależność przyrostu drzew od klimatu solarnego. **[Dependence of tree growth on solar climate.]** *Roczn. dendrol. polsk. Tow. bot., Warsz.* 9, 1953 (215–24). 25 refs. [Pol.russ.e.]

The variation curve over a period of 91 years (1856–1946) in the average ring width of 15 *Picea abies* stems (Tatra Mountains, alt. 1250 m., NE. aspect, an open, pure stand, age > 100 years, on sandy loam with much humus, bedrock at 1 m.) showed similar trends to the 'Wolf-number' (sun-spot-frequency) curve over 4 periods totalling 59 years. Any correlation can be explained tentatively by the variation in air temperatures, the curves of which display similar trends. The correlation was most pronounced in the period May–August (growth period), and could be extended also to rainfall and air-humidity curves.

3914. Messeri, A. Relazioni fra clima ed accrescimento del tronco nel pino d'Aleppo: osservazioni nella pineta di Patemisco Gallio (Golfo di Taranto). **[The relationships between climate and increment of the stem of *Pinus halepensis*: observations in the Pinewood of Patemisco Gallio, Gulf of Taranto.]** *Repr.* from *Nuovo G. bot. ital.* (*n.s.*) 60, 1953 (251–86 + 1 plate). 18 refs. [It.e.]

A study based on 5 trees growing on coastal sands. It was shown that the constant presence of accessible groundwater results in very low increment in ring width and a lower sensitivity of the tree-ring sequences to climatic variation. The deeper the water-table, the greater was the average width of growth ring and the higher the sensitivity of growth-ring sequence. It appears, therefore, that the presence of accessible groundwater has little positive effect on rate of increment of *P. halepensis* and sometimes appears actually to check its growth, probably by preventing adequate aeration of the soil. The growth curves appear to coincide with the rainfall curves of the meteorological rather than of the calendar year, and more closely still with the curves of rainfall in the autumn and winter months or of two meteorological years (the current and the preceding ones). A low amount of rainfall uniformly distributed during the growing season produces a wider growth ring than a larger amount irregularly distributed. Other factors affecting growth are the duration and degree of aridity during the summer and the temperature during the autumn when the index of aridity diminishes.

3915. Petrini, S. Intérêt simple ou intérêts composés dans le calcul de la croissance. **[Simple or compound interest in calculating increment.]** *Skr. K. Skogshögsk., Stockh.* No. 12/19, 1953 (35–42). [F.sw.]

Compares the results given by simple and by compound interest in volume increment prediction, taking as a standard certain hypothetical series of values constructed upon the assumption that the volume c.a.i. remains constant throughout the period. This gives a volume increment % curve that falls more steeply than those usually found in actual practice. Increment % values computed on this basis for each year in a 10-year period are tabulated for assumed 1st-year values ranging from 10 down to 1%, and the series of values so obtained are used to calculate from the initial capital (volume) the final volume after 5 and 10 years, using (*a*) simple interest at the increment % rates specified for the first year (this gives correct results here since c.a.i. is constant by hypothesis), and (*b*) compound interest, based on the increment % found for the middle of the period. Results, given in round figures, show that where any appreciable difference exists between (*a*) and (*b*), the latter always gives a small *negative* error ($\leqslant -2{\cdot}5$ %), especially for the highest increment %s. In practice, particularly in well tended stands, the increment % will decline over such a period less steeply than in the limiting case examined and may approach the condition for which (*b*) will give exact results (viz. when the increment % remains constant) and (*a*) will give under-estimates. Provided that the period does not exceed 10 years, the use of compound interest entails no risk of over-estimating the increment and final volume.

562. *Volume Increment*

See also No. 3872.

3916. Ilvessalo, Y. **Some figures on the relationship between the present and possible growth in Finnish forests.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 25 (No. 25), 1953. pp. 5 + 1 gph. 2 refs. [E.] Limited distribution.

Tabulated figures show the volume c.a.i. and total volume production from thinned and unthinned stands of Pine and Spruce.

3917. Ilvessalo, Y. **Mortality from natural causes in the Finnish forests.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 25 (No. 26), 1953. pp. 4. 7 refs. [E.] Limited distribution.

Cf. *For. Abstr.* 15 (No. 1661).

3918. Ilvessalo, Y. **Some efforts at the rapid determination of growth in Finnish forests.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 25 (No. 28), 1953. pp. 5. 4 refs. [E.] Limited distribution.

Discusses different methods of estimating increment, and gives extracts from auxiliary tables for calculating volume and increment on the basis of main species, dominant height and density, and of main species, age and density respectively.

565. *Sample-plot Technique*

3919. Setten, G. G. K. **A summary description of increment sample plot methods in Malaya.** [*Pre-issue*] *Proc. Congr. inst. Union For. Res. Organ., Rome, 1953*, Section 25 (No. 27), 1953. pp. 7. 5 refs. [E.] Limited distribution.

3920. Setten, G. G. K. **Girth increment (linear) sample plots in Malaya and the 1952 rules for their compilation.** *Res. Pamphl. For. Res. Inst. Kepong* No. 13, 1954. pp. 10 + 1 photo, 2 sample forms and 3 tbls.

3921. Beard, J. S. **Investigations into experimental plot technique with Black Wattle [*Acacia decurrens* var. *mollissima*].** *Emp. For. Rev.* 33 (2), 1954 (158–71 + 1 plate). 3 refs.

Experimental plots in Black Wattle should be so laid out as to equalize any variations in the uniformity of the field introduced by silvicultural methods. The disposal of brushwood is the principal source of such variation. Stocking must be carefully controlled. Wattle plots must never be less than 4 trees in width. Six or 8 rows are still better. For experiments to be carried till final felling, a plot size of ca. $\frac{1}{10}$ acre is recommended. Blocks of plots should be square or compactly rectangular. Latin squares are slightly more efficient than randomized blocks, and lattice designs are greatly superior to either, even with relatively few treatments. The degree of replication required increases with the number of treatments and varies also with the type of design. The replications required with different designs and treatment numbers are tabulated. Mature trees may be sampled for height and diameter by measuring at random one tree per row for height and two for diameter. Young trees are less variable than mature trees. Experiments to be concluded by 3 years of age need have plots only $\frac{1}{20}$ acre in size, with fewer replications. In sampling at one year of age, every tree in a $\frac{1}{20}$-acre plot should be measured, and every other tree at 3 years. With larger plots, samples of 40 and 20 trees per plot should be taken, at 1 and 3 years respectively. It is much more economical in time, space and effort to work in young trees, and there is a case for doing the bulk of the experimenting, as far as possible, on results assessed at 3 years of age, carrying relatively few more elaborate experiments to maturity for confirmation. *From author's summary.*

3922. Ayral, P. Sur le calcul du volume, total et par catégories de produits, des peuplements restant sur pied dans les places d'essais au passage des éclaircies. **[The calculation of total volume and volume by assortments of stands remaining after thinnings.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome, 1953*, Section 23 (No. 1), 1953. pp. 11. 2 refs. [F.] [Station de Recherches et Expériences forestières de Nancy.] Limited distribution.

In calculating the residual volume, sample trees are selected, representative of various tree classes (based on g.b.h., dominance, and crown and stem form) and in the same relative proportions as the classes are present in the residual stand. The sample trees are selected as far as possible from the trees marked for thinning, and are scaled after felling, but if suitable trees are lacking these are selected from the residual stand and scaled standing, using a duralumin ladder [see *For. Abstr.* 13 (No. 236)] with modifications allowing the top section to be moved in a lateral groove so that irregularities in the trunk can be measured. The volume of each class of tree is determined and allocated to assortments. The method was tested by marking as for light and heavy thinnings, areas due to be clear-felled; tables are given showing the actual and predicted volumes, and the results obtained by this method were very much more accurate than those from sample trees selected only from the trees marked for thinning.

566. *Yield Tables and Their Construction*

See also No. 3952.

3923. Fekete, Z. A hazai fatermési vizsgálatok. **[Hungarian work on yield tables.]** *Erdömérnöki Föiskola Évkönyve Sopron 1951/52, Budapest* 1953 (47–61). 6 refs. [Hung.russ.g.]

A survey of progress since 1854. The more recent tables are for Robinia and Oak; those for Beech and Poplar are in train.

3924. Joyce, P. M. **Comparison in yields of Sitka and Norway Spruce [in Ireland].** *Irish For.* 10 (2), 1953 (67–8).

Measurement of $\frac{1}{10}$-acre plots of 30-year-old Sitka and Norway Spruce showed that mean annual increment of Sitka was 72% greater than that of Norway Spruce. Forestry Commission yield tables are quoted for comparison with results in Great Britain.

3925. Patrone, G. Tavola alsometrica delle fustaie coetanee di faggio del Molise. **[Assortment yield table for the even-aged high Beech forest of Molise.]** *Ital. for. mont.* 9 (1), 1954 (41–4). [It.f.]

567. *Stand Tables*

See also No. 3909.

3926. Prodan, M. Verteilung des Vorrates gleichaltriger Hochwaldbestände auf Durchmesserstufen. **[Distribution of the growing stock of even-aged high-forest stands over diameter classes.]** *Allg. Forst- u. Jagdztg.* 124 (4), 1953 (93–106). 14 refs. [G.g.e.] [Badische Forstliche Versuchsanstalt.]

Using the extensive data represented by Mitscherlich's assortment yield tables for Norway Spruce, Scots Pine, Beech and Oak, along with data from his own studies of stand structure in Spruce, Schober's assortment table for Larch, and some supplementary material, the author examines the frequency distribution of tree numbers over d.b.h. classes, adopting Mitscherlich's method of characterizing frequency curves by h_{max} = the ordinate value of the maximum % frequency. Factors (age, site quality, area, silvicultural factors, and species) influencing the degree of approach to the normal frequency distribution are briefly discussed. For even-aged stands, Charlier's A-function offered a suitable measure of skewness and was used to construct model curves from which all the frequency curves needed could be derived: these, which are presented as tables, give for 2- and 5-cm. d.b.h. classes irrespective of species, tabulated against h_{max}, (1) the % frequency of tree numbers as cumulative totals from the lowest to the highest d.b.h. class, and (2) the % frequency separately for each d.b.h. class. Similarly arranged tables are also presented for volume distribution over d.b.h. classes, using von Laer and Spiecker's volume curves as the basis of calculation. To find the correct frequency curve, it is necessary to know the value of h_{max} as related to d.b.h. of the tree of mean b.a. This varies with factors such as those mentioned above, but especially with species and growth region, and also with type of data (research data, or routine enumeration data for larger, less homogeneous areas). The variation with the factors specified is shown graphically and h_{max} values are tabulated for the range of species and conditions represented by the basic material. As an addendum, based on the frequency curves deduced, a table is given for the rough estimation of the arithmetic mean d.b.h. and the d.b.h. of the b.a. mean tree in % of the total tree number, counting from the smallest diameter up.

568. *Other Mensurational Studies of Stand Constitution and Changes Therein, Distribution of Growth by Tree Classes etc.*

3927. Assmann, E. Die Verlagerung der Höhenkurven von Plenterwaldflächen und ihre Ursachen. **[The upward movement of height curves of selection-forest plots and its causes.]** *Allg. Forst- u. Jagdztg.* 124 (6), 1953 (175–7). 6 refs. [G.]

The 'constancy of class heights' in selection forest, i.e. the comparative constancy in time of the mean height of individual diameter classes, first put forward by Flury, is shown by his own data for Swiss selection-forest plots to hold good only for the lower diam. classes: in the 38–50 cm. and higher classes there is an evident systematic increase of class heights with time. The analogue of selection-forest height curves is to be sought in those of the whole felling series in regular high forest, and comparison of (*a*) height curves plotted from Flury's data for Spruce in the Toppwald and (*b*) curves for Spruce felling series on different rotations (based on data published by Zimmerle) shows that a full analogy exists—the curves having the same shape, and the upward displacement of heights for given diam. classes increasing with successive enumerations for (*a*) and with increase of rotation for (*b*). From evidence on fellings and age of trees in (*a*) it is inferred that the treatment of this selection forest implies a 'latent rotation' of ca. 200 years, and that the upward shift of the height curves is attributable to an increase in the mean age, with corresponding increase of mean height, of trees in the upper diam. classes; though total growing stock remained nearly constant, the proportion in these classes increased between enumerations owing to concentration of fellings in lower classes. The effect is analogous to that of keeping total growing stock constant making heavy thinnings especially in the middle age classes, and increasing the rotation, in a normal felling series in regular high forest. The height curves of a selection forest could remain constant only if the equilibrium condition for a given total growing stock and a given rotation had been reached and maintained. Though age of trees is very difficult to determine in selection forest, its effects are not eliminated and their study is necessary for the understanding and solution of certain problems, e.g. assessment of site quality class and comparison of increment with that of regular forest.

3928. Galoux, A. Contribution à l'étude de la futaie de chêne jardinée par bouquets. **[A contribution to the study of *Quercus sessiliflora* group selection forest.]** *Trav. Sta. Rech. Groenendaal (Sér. B)* No. 14, 1953. pp. 16. 7 refs. [F.]

A theoretical study of the development and structure of an ideal pure stand compared with an actual stand at Chimay (coppice with a large number of standards), for the purpose of converting the latter to group selection forest.

58. SURVEYING AND MAPPING. AERIAL SURVEYS

See also No. 3663.

3929. **Forest type classification for the Pacific Northwest region [for use in the national Forest Survey].** U.S. Forest Service [Washington, D.C.]. 1949, rev. 1952. pp. 33.

Symbols are given for predominant species, stand size classes, condition of non-stocked areas, forest type (residual stand, restocked after clear-felling, planted), stand density, species composition and age class. Symbols are also given for woodland or non-commercial forest land and non-forest land.

This classification is correlated with others and examples of its use are given.

3930. Sonderheft 'Forstliche Photogrammetrie'. **[Special number on forest photogrammetry.]** *Forstarchiv* 23 (9/10), 1952. [G.]

Contains the following contributions, all having chief reference to the possibilities under German conditions: Photogrammetric methods and their economic and technical importance (*A. Möhle*; pp. 177–8); Present position and prospects of forest photogrammetry (*W. von Laer*; pp. 178–80); Experience in the interpretation of aerial photos for forestry purposes (*R. Back*; pp. 180–3); Organization of aerial survey flights (*W. Schütz*; pp. 183–5); Practical aerial photo interpretation for the purposes of forest management, exemplified by work in the Neuhäusel forest district (*W. von Laer*; pp. 185–7); The use of aerial photos in forestry practice (*M. Spiecker*; pp. 187–8); Aerial photos as an aid in forest site mapping (*E. Volkert*; pp. 188–92); Aerial photos and 'indicator strips' [permanent 10-m.-wide strips on which the forest stand, young growth and ground cover are recorded graphically; and the use of such strips as ground control for aerial photo interpretation] (*M. Spiecker*; pp. 192–4); Rectification of aerial photos of mountainous terrain (*H. Richter*; pp. 194–5; 5 refs.); The accuracy of forest base maps prepared by photogrammetry (*W. von Laer*; pp. 195–7); Bibliography of German literature on forest photogrammetry (71 refs.) and indication of further sources of information (pp. 197–8).

3931. WODERA, H. Forstpflege in den Vereinigten Staaten. **[Forest management in the U.S.A.]** Österreichisches Produktivitäts-Zentrum, Wien. 1951. pp. 263 + 3 maps. [G.]

A report based on an E.C.A. Technical Assistance study tour, covering all aspects of organization and administration, and giving particular attention to the use of photogrammetry.

3932. LOSEE, S. T. B. **The applications of photogrammetry to forestry in Canada.** *Photogram. Engng.* 18, 1952 (742–53). 8 refs. L.S.

3933. GREELEY, A. W., WRIGHT, K. H., and POPE, R. B. **Final report on the 1952 blowdown-bark-beetle survey in the Douglas Fir region of Oregon and Washington.** Pacific Northwest Forest and Range Experiment Station, Portland, Oregon. 1953. pp. ii + 30 + 33 + 4 maps. 4 refs.

Presents details of the organization of an air survey of the 1951–52 blowdown and the associated 1951 attack by *Dendroctonus pseudotsugae*, gives data on the loss of timber, and makes recommendations on logging for beetle control and protection against fire.

3934. THORNTON, P. L. **An aid for stereo dot counting on aerial photos.** *Sta. Note Cent. St. For. Exp. Sta.* No. 84, 1954. pp. 2.

A flexible dot template printed on film is hinged over a recess $\frac{1}{8}$ in. deep and of a size to hold the photographs in a board. The use of the board is described and illustrated.

3935. GETCHELL, W. A., and YOUNG, H. E. **Length of time necessary to attain proficiency with height finders on air photos.** *Tech. Note Univ. Me. For. Dep.* No. 23, 1953. pp. 2.

Using a wedge-type and a single floating dot finder.

3936. WIESLANDER, A. E., and STORIE, R. E. **Vegetational approach to soil surveys in wild-land areas.** *Proc. Soil Sci. Soc. Amer.* 17 (2), 1953 (143–7). 8 refs. L.S.

Before World War II the high costs of soil surveying and mapping precluded their use except in agricultural areas where land values are high. Since 1947 the improved use of aerial photographs and the decline in costs have made possible a survey of more than 3 million acres of mountainous land in California. The methods used are described. Before field work begins, boundaries of vegetation and soil units are marked out in advance on aerial photographs. The field work is thus made easier and produces much basic information on native vegetation related to soil, which may be valuable in forest and range management. Sample charts are presented showing the kind of data collected.

3937. GROULEZ, J. L'utilisation de l'avion dans les reconnaissances et prospections forestières au Gabon. **[The use of aircraft for visual reconnaissance in forest surveys and exploration in Gabon.]** *Bois For. Trop.* No. 35, 1954 (25–32). [F.f.e.span.]

The forest department in Gabon has for 2 years been using a 4-seater Auster-Autocar monoplane for reconnaissance in connexion with various projects (discovery of areas suitable for enrichment with *Aucoumea klaineana*, opening up of reserves to exploitation, creation of reserves, planning logging roads, forest inventories etc.). The conditions of work and costs/ha. for each type of use are indicated.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

See also No. 3931.

3938. WEITBRECHT, P. Bewirtschaftungsprobleme in einem Buntsandsteinrevier des Hochschwarzwaldes. **[Management problems in a bunter-sandstone forest range in the high Schwarzwald.]** *Allg. Forst- u. Jagdztg.* 124 (2; 3), 1952–53 (51–7; 79–90). [G.]

Gives accounts, based on working-plan and other records and the author's experience since 1920, of the site factors, present composition (largely pure, even-aged Norway Spruce) and history of the stands in the Obertal forest, and of the silvicultural treatment and principles applied during the last 40 years (including both unsuccessful and successful use of the *Blendersaumschlag* system), in order to deduce the broad lines that future management should follow, under the heads: economic considerations, division of the area, the road network, need for care and improvement of the site, segregation of protection forest from production forest, silvicultural systems (for the most part regular high forest, but mixed, and often with underwood; selection forest only on the best sites and where adequate roads are present); felling series on the various site groups recognized (Spruce/Silver Fir/Beech; Scots Pine; protection forest; all with admixtures of broadleaved species plus e.g. Japanese or European Larch, *Pinus strobus*, Douglas Fir); logging practice; silvicultural technique (measures for site improvement, planting and sowing, seed and plant supply, tending); and torrent training.

3939. BOSSHARD, W. Die Mindestfläche für einen nachhaltigen Femelschlagbetrieb. **[The minimum area for a management unit under a permanent *Femelschlag* system [with group regeneration].]** *Schweiz. Z. Forstw.* 105 (2), 1954 (106–23). [G.f.]

The theoretical determination of minimum management areas for a given silvicultural system is based on schematic 'normal' felling series with uniform ecological conditions and a single species. For group regeneration under an irregular shelterwood system, the author has worked out the following theoretical minimum areas in ha.: *Fagus sylvatica* 1–4·5, *Quercus robur* s.l. 7–16, *Larix decidua* 6–19, *Pinus sylvestris* 5–18, *Fraxinus excelsior* 3–9, *Acer pseudoplatanus* 3–9, and *Alnus glutinosa* 2–6. The determination of practical areas is a matter of adapting these theoretical values to actual conditions, e.g., mixture of species, ecological variations, stand structure etc. In this way an area of 10–40 ha. is obtained for *Querceto-Carpinetum* according to the proportion of the species. In general, a large proportion of Oak demands larger minimum areas, of Pine and Larch medium ones, and of shade-tolerant, short-lived species, small ones. In mixed Ash/Sycamore Maple it is 5–15 ha.

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also No. 3407.

3940. GUILKEY, P. C. **Growth versus allowable cut.** *J. For.* 52 (4), 1954 (257–9).

Discusses in general terms the methods of yield regulation practised in the Lake States.

3941. GROVE, E. R., TAYLOR, L. S., and TURNER, S. M. **Calculating the annual cut in uneven-aged pulpwood stands.** *Tech. Note Univ. Me. For. Dep.* No. 6, 1951. pp. 2. 2 refs.

64. FORESTRY AS A BUSINESS: GENERAL

3942. TOFANI, M. Situazione e sviluppo degli studi di economia forestale in Italia. **[The present state and evolution of forest economic studies in Italy.]** *Ital. for. mont.* 9 (1), 1954 (11–9). 27 refs. [It.f.]

3943. VAUX, H. J. **Economics of the young-growth Sugar Pine resource.** *Bull. Calif. agric. Exp. Sta.* No. 738, 1954. pp. 56. 43 refs.

Concludes that intensive management of *Pinus lambertiana* is economically justified on highly productive sites, but not elsewhere. Criteria for deciding which lands should be so managed are given.

3944. KURIMURA, T. **[An analysis of production and supply in forestry.]** *For. [industr.] Econ., Tokyo* 7 (1; 2), 1954 (5–22; 22–32). 12 refs. [Jap.]

A theoretical study, concerned mainly with the fluctuations of outturn from natural forests and plantations according to changes in demand (and therefore price), with numerous graphs.

3945. NOMURA, I. **[Fundamental studies on price policy for forest products.]** *For. [industr.] Econ., Tokyo* 7 (2), 1954 (1–21). 35 refs. [Jap.]

Discusses and makes tentative recommendations for forestry against the background of agricultural price policy, particularly in U.S.A. and Japan.

3946. BELLUCCI, V. Rilievi sulla economia forestale Toscana. **[The forest economy of Tuscany.]** *Ital. for. mont.* 9 (1), 1954 (28–33). [It.f.]

Gives figures from typical coppice stands of Evergreen Oaks, Beech, Chestnut and Hornbeam for number and kind of animal pastured, financial return on livestock and wood products and financial returns/ha./year on labour, and invested capital separately and together; for several Pine and Fir stands figures are given of rotation, establishment costs, tending costs, and returns on thinnings and final fellings.

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 3556, 3565, 3671–2, 3900, 4306.

3947. Herberekeningen van de kostprijzen voor hout van groveden, Douglas, populier en inlandse eik (Rapport nr. 144) in verband med de gewijzigde loonkosten. **[A fresh calculation of cost price of timber of Scots Pine, Douglas Fir, Poplar and native Oak (Report no. 144) in connexion with the revised wage scales.]** *Nota, Landbouw-Economisch Instituut, Den Haag* No. 98, 1952. pp. 21. [Du.]

Cf. *For. Abstr.* 13 (No. 4130).

3948. BICKFORD, C. A. **An aid in choosing the right tree to leave.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 65, 1953. pp. 8.

Includes, with instructions for use, a slide-rule device used to determine for *Liriodendron tulipifera* what interest rate is earned by trees of various sizes and growth rates during a 10-year period and what growth is required to earn 3% compound interest on trees of various sizes over different periods of time. The use of the slide-rule for other species and for districts outside W. Virginia is discussed.

3949. JENNINGS, S. G. **Utilisation and stumpage appraisal of softwood plantation thinnings in Queensland.** *Aust. Timb. J.* 20 (1), 1954 (38 . . 44).

Discusses stumpage rates for various species of Pine in sizes suitable for case timbers.

3950. ADOMAT, R. Die Umrechnung der badischen Bonitierung zur Einheitsbewertung. **[The conversion of the Baden site quality classes into standard values.]** *Forstwiss. Cbl.* 73 (1/2), 1954 (11–18). 4 refs. [G.]

Discusses the use of different yield tables in forest valuation for taxation purposes in Germany, for which national uniform scales were set up in 1925, and demonstrates the conversion of the site-quality values used in local yield tables in Baden to those used in Wiedemann's tables, upon which the uniform valuation scales are based.

3951. HERMANSEN, N. K. Die Verteilung der Anteile in Waldwirtschaftsgenossenschaften. **[The distribution of shares in forestry ownership associations.]** *Årsskr. Vet.-Landbohøjsk.* 1954 (51–71). 7 refs. [G.]

Discusses methods of calculating the value of holdings of individual forest owners when small woodlands in different ownership are managed as a whole. This form of ownership is established by Danish forestry legislation but is in fact rarely practised.

3952. OLBERG, A. Zur Theorie der Bestandsbeurteilung nach der Wertholzertragsfähigkeit. **[On the theory of appraising the capacity of stands to yield high-grade timber.]** *Forstarchiv* 25 (1), 1954 (1–5). 3 refs. [G.]

In extension of previous suggestions [see *For. Abstr.* 14 (No. 1458)] the author re-calculates yield-table figures for Scots Pine and Beech to obtain standards of comparison for the high-grade timber yield of stands, defining such timber as logs usable in their entire length for veneer and other of the more valuable timber products, and taking specified minimum d.b.h. and log-length values (varying with site quality) as criteria for the present purpose. It is shown that of the two most convenient measures for the amount of such timber per ha., viz. volume or number of trees, the former is useless below an age which varies with species and site quality, but can be used alone when the stand age exceeds another range of values. Between these ages it is advantageous to use both measures in conjunction. Tables are presented showing for each species, by age and site quality: (1) volume of high-grade timber in main crop and thinnings, along with increment (next 10 years and up to 140 years); and (2) number of high-grade stems in main crop and thinnings, along with the number represented in the increment to age 140 years. Data for actual stands can be expressed for comparative purposes in % of the table figures, and it is possible to apply corrections where the actual log lengths are shorter than those on which the tables are based. This method is applicable only to even- or moderately uneven-aged stands, pure or mixed.

66. COSTING OF LOGGING OPERATIONS

See also No. 3606.

3953. HALLEY. **Costs of logging in the Cameroons.** *Emp. For. Rev.* 33 (2), 1954 (142–9). Transl. from *Bois For. Trop.* 32, 1953 (15–23). [See *For. Abstr.* 15 (No. 2781).] Also in *Wood* 19 (5), 1954 (196–200).

3954. WALLACE, O. P. **Methods for obtaining minimum cost logging in northern New York and New England.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (4), 1954 (578). [University of Michigan.] O.R.S.

Time studies in the Adirondack region of New York were used to construct production tables suitable for determining logging costs and planning logging organization.

3955. RANDALL, A. G., and CUNNINGHAM, P. H. **A first progress report on methods of cutting blocks, Indian Town, Washington County, Maine.** *Tech. Note Univ. Me. For. Dep.* No. 26, 1954. pp. 2.

Preliminary report on a study of pulpwood logging costs for different degrees of selective cutting (i.e. different diam. limits for various species) in dense, young, mixed stands in Maine.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

681. *National (Federal, State) Forest Services and Administration*

See also No. 4393.

3956. HILTON, H. C. **The forest service of the Republic of Turkey.** *J. For.* 52 (4), 1954 (282–3).

686. *Planning and Organization of Buildings, Transport Installations (Roads etc., including Power-line Rights-of-Way)*

See also No. 3608.

3957. FARKAS, T., and SÁRKÁNY, J. A földi fotogrammetria felhasználása feltáro vonalak tervezéséhez. **[Application of terrestrial photogrammetry for the planning of lines of communication in undeveloped areas.]** *Erdömérnöki Föiskola Évkönyve Sopron 1951/52, Budapest* 1953 (23–46). 8 refs. [Hung.russ.g.]

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

71. MARKETING OF FOREST PRODUCTS: GENERAL

3958. Lamb, F. B. **Utilization, distribution and management of tropical American Mahogany.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (4), 1954 (577–8). [University of Michigan.] O.R.S.

Reviews the history of the Mahogany trade, discusses the relationship between timber properties and uses, and studies ecological and silvicultural characteristics and management practices in relation to supply.

3959. Latham, B. **Mahogany. 1. Introduction to Europe. 2. The trade to 1850. 3. 1850 onwards.** *Wood* 19 (1–3), 1954 (15–7; 87–9; 125–7).

3960. Smith, J. T. **Scottish home grown timber trade, 1854–1953.** *Scot. For.* 8 (2), 1954 (62–74).

3961. Teillac, J. Le commerce des bois en Côte d'Ivoire: des débouchés, conditions de transport et de la formation des prix. **[The timber trade in the Ivory Coast: markets, freights conditions, and quotation of prices.]** *Bois For. Trop.* No. 33, 1954 (54–67). [F.]

3962. Campagne, B. B. Les industries forestières de la Côte d'Ivoire. **[The forest industries of the Ivory Coast.]** *Bois For. Trop.* No. 35, 1954 (11–9). [F.f.e.span.]

Notes on sawmills, timber supplies, labour and equipment, grades and price indexes, markets, and competition with imports, a new pilot pulp mill, manufacture of wood wool, and species utilized.

3963. Gonzalez H., D. Mercados de la madera. **[Timber markets.]** In *Bosques y Maderas* [special issue of *Chile maderero*], 1954 (39–42). [Span.] [Primer Congreso Forestal Maderero Nacional.]

About 60% of Chile's timber is consumed by home markets. Some problems of the home market are discussed, viz. distance of consumption areas from production areas, the mixture of species and % of low-grade timber produced, lack of knowledge of timber properties and failure to adopt the metric system.

72. THE QUANTITATIVE ASPECTS OF MARKETING.

See also Nos. 3980, 4404, 4409–10.

3964. **Final report on the census of production for 1948. Volume 10. Trade A. Timber.** H.M. Stationery Office, London. 1952. pp. 40. Price 3*s*. 6*d*. P.R.

Gives tabulated data relating to: employment; specialization within the trade; sales; exports and imports of certain principal products; materials and fuel; wages and salaries; plant, machinery and vehicles—for the timber industry in the United Kingdom as a whole, and the 4 constituent countries.

3965. Holopainen, V. **Fluctuations in the United Kingdom imports of sawn softwoods and their causes in 1921–1950.** *Prepr.* from *Commun. Inst. for. Fenn.* 41 (7), 1953. pp. 106. 133 refs. [E.fi.]

3966. Agermose, K., and Plum, N. M. Danmarks træforbrug til byggeriet 1939–1952. **[Denmark's use of wood in building 1939–52.]** *Træindustrien* 4 (1), 1954 (5–10). [Dan.] P.R. (Also in *Byggeindustrien* No. 24, 1953.)

3967. **Timber production statistics.** *Aust. Timb. J.* 20 (1), 1954 (10 . . . 21).

Includes production data for the different states and graphs showing the sawn timber [internal] supply for the Commonwealth of Australia for 1910 to 1952–53.

3968. Lachance, P. E. **Quebec's pulpwood resources: a study of the pulp and paper industry of the Province of Quebec in relation to its present and future wood supplies.** *Pulp Paper Mag. Can.* 55 (3), 1954 (276 . . . 332). 30 refs.

With data on land ownership and forest resources.

73. PRICES

See Nos. 3944–5, 4306.

78. ECONOMICS OF TRANSPORT

See No. 3655.

79. ECONOMICS OF THE WOOD INDUSTRIES

See also Nos. 3962, 3964, 4195, 4216, 4393, 4409.

3969. Locke, E. G., and Johnson, K. G. **Wood resources [of the East North Central States].** *Industr. Engng. Chem.* 46 (3), 1954 (478–83). 24 refs. P.R.

Tabulates the estimated annual amount of wood available for chemical industry in Wisconsin, Michigan, Minnesota, Illinois, Indiana, Ohio, Kentucky, and Missouri, and discusses the four primary chemical industries, involved; pulping, wood distillation, wood extraction, and wood hydrolysis.

3970. **Possibilities for the development of the pulp and paper industry of Latin America: a joint study by the Economic Commission for Latin America and FAO.** United Nations Department of Economic Affairs, New York. *E/CN.* 12/294/Rev. 2, 1954. pp. 142. Price $1·50 (11*s*.).

Deals, by countries, with productive capacity and consumption, forest resources, and possibilities of development based on local raw materials (e.g. Parana Pine in Argentina and Brazil, Eucalypts in Brazil, *Pinus radiata* in Chile, sugar cane bagasse in Cuba, Peru and Central America and tropical woods in Mexico). There are 214 tables of statistics.

3971. Vial Clark, E. Mercado para la pulpa de madera y papel de diarios. **[The market for wood pulp and newsprint.]** In *Bosques y Maderas* [special issue of *Chile maderero*], 1954 (50–6). [Span.]

The present state of *Pinus radiata* plantations in Chile; a review of pulp and newsprint markets in N. and S. America and in Japan; a discussion of prices since 1930; and recommendations for the future of the Chilean industry.

8. FOREST PRODUCTS AND THEIR UTILIZATION

3972. Institut National du Bois. Six années de recherches: 1947–1952. **[Institut National du Bois [Paris]. Six years of research work: 1947–52.]** Imprimerie Nationale, Paris. 1953. pp. 112. [F.] P.R.

Report on research done in the following sections: anatomy and cytology of wood; mycology; entomology; chemistry; physics (including seasoning and preservation); timber mechanics and wood-working; pulp and paper; as well as the work of the documentation section.

3973. **The Forest Products Laboratory [, Madison]: a brief account of its work and aims.** *Agric. Inform. Bull. U.S. Dep. Agric.* No. 105, 1953. pp. 33.

3974. **Development of Michigan's timber industries through forest products research.** *Bulletin of the Michigan College of Mining and Technology, Houghton* (*n.s.*) 26 (1), 1953. pp. [26]. 37 refs. P.R.

A review of the work of the Forest Products Research Division, Michigan College of Mining and Technology, Houghton, Mich.

3975. Varossieau, W. W. **Forest products research and industries in the United States.** Published for Contactgroep Opvoering Productiviteit, The Hague, by J. M. Meulenhoff, Amsterdam. 1954. pp. 796 + 64 photos. 1156 refs. [E.] Price *Fl.*45. I.F.B.

Reports on a tour of the U.S.A. under the auspices of O.E.E.C. to determine to what extent American methods might be of value in European forest products industries. The material is treated under the headings (1) Forestry contacts—(*a*) forest resources, (*b*) damage and losses, (*c*) reforestation, (*d*) harvesting, logging and transport to mill; and (2) Contacts with forest products and allied industries —(*a*) sawmills, (*b*) timberyard practice, (*c*) wood-preserving industries, (*d*) plywood and allied products industries and (*e*) derived products and by-products industries. Conclusions of the report include recommendations for the use of some American methods in Holland, for the development of a universal identification scheme for wood species, and for more internationally co-ordinated research on various subjects.

3976. Philippis, A. de. Produzione ed usi del legno di Eucalitti in Australia. **[Production and uses of Eucalypt wood in Australia.]** *Repr.* from *Cellulosa e Carta, Roma* 4 (3), 1953. pp. 7. [It.]

3977. **Logging and utilization of Poplar wood. Note of the secretariat.** [*Paper*] *Near East Poplar Conference 1954, FAO, Rome* No. *FAO/NEPC/7*, 1954. pp. 14. [E.]

Suggests possible uses and recommends desirable lines of research. Forms for recording measurements of sample trees and tests on wood samples are annexed.

3978. Términos usados en relación con maderas. **[Terms used in connexion with timber.]** *Chile maderero* 4 (1), 1954 (1 . . 6). [Span.]

Defines terms connected with timber processing, dimensions, volume and defects.

3979. Hoerning, C. Significado de la normalización. **[The importance of standardization.]** In *Bosques y Maderas* [special issue of *Chile maderero*], 1954 (47–9). [Span.]

Reviews briefly the progress of standardization in the Chilean timber industry, and lists the standards issued to date by INDITECNOR (Instituto Nacional de Investigaciones Tecnológicas y Normalización).

3980. **[Conference on] Caribbean timbers, their utilisation and trade within the area.** [Caribbean Commission, Port of Spain, Trinidad.] [1952]. pp. 253. Limited distribution.

Includes the following papers:—The advantages of standardization of milling sizes and grades of timber within the area (*I. A. de Hulster* and *J. E. Heesterman*); Standardization of milling sizes and grades within the area: problems of the producer (*H. W. Grey*); Problems of the consumer (*W. M. Woodhouse*); Information on standardization of milling sizes of sawn timber and of prefabricated wooden parts of houses in the Caribbean area [summary of answer to a questionnaire]; Grading of French Guiana lumber (*P. Bena*); Some problems of the Puerto Rican consumer (*F. H. Wadsworth*) [Less than 10% of Puerto Rican imports of forest products come from the Caribbean region; this figure would probably be considerably increased if a uniform product of standard dimension, grade and moisture content could be offered]; Standard lumber grades and sizes in the United States (extract from manuscript by Forest Products Laboratory, Madison, Wis.); Termite damage and control as factors in the utilization of the timbers of the area (*G. N. Wolcott*) [*Cryptotermes brevis*, *Heterotermes tenuis*, and *Nasutitermes costalis* are described as the economically important species of the area; control measures are discussed, but it is suggested that there are now sufficient data available to make the planting of termite-resistant species the best long-term solution to the problem]; The value of a centralized market information service for Caribbean timbers (*F. H. Beyerinck*) [The findings are presented of a survey on the need for a market information service, the type of organization required, estimates of cost, etc., and the results summarized of a questionnaire to Forest Services, Chambers of Commerce, timber trade associations and lumber dealers]; Standardization of milling sizes—adoption of Association Française de Normalisation (AFNOR) standards—adoption of standard measures (*P. Bena*); Value of the schedule for recording external morphological data (*P. Bena*) [Criteria for field identification of tropical species are presented, with explanatory notes; also a specimen form of record drawn up by the Comité National des Bois Tropicaux]; Nomenclature—presently marketable timbers [Tables citing scientific and trade names and local or regional names for the whole Caribbean area]; Information on properties of timber gathered by questionnaire and collated in the Secretariat of the Caribbean

Commission, including some related data from technical literature. [Extracts from published sources and questionnaire replies are given in 18 appendixes, and the data collected from both sources are analysed under the following headings:—mechanical properties (with particular reference to working stresses), physical properties (including working properties), chemical properties, anatomical properties, technological properties; shrinkage, air seasoning, kiln drying, natural durability, preservative treatment, types of local use that have been found successful, and usage habits for each territory.]

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

See also No. 3291.

3981. Gerard, G. Critères statistiques appliqués aux essais de bois. **[Statistical criteria applied to tests on wood.]** Association Belge pour l'Étude, l'Essai et l'Emploi des Matériaux, [Bruxelles]. 1953. pp. 23. 3 refs. [F.] P.R.

A communication read at the 129th meeting of the Association at Brussels, dealing with (1) causes of variability (factors influencing growth); (2) tests on wood; (3) fundamental principles of biometry; (4) their application to the properties of wood; and (5) rationalization of techniques.

3982. Paclt, J. Technika biologického výskumu dreva. **[The technique of biological research on wood.]** Štátne Nakladatel'stvo Technickej Literatúry, Bratislava. 1953. pp. 80 + [5] + 2 dgms. 50 refs. [Slovak.] Price *Kčs.*5·80.

Includes sections on: collection of material for tests, its fixation, preparation and preservation, and microscopical technique; the methods used in microanatomical, biochemical, mycological and zoological research on wood, and a section on recording the results. Contains, *inter alia*, a list of scientific, Slovak and Czech names of 52 common European tree species.

810. *General Information on Woods*

See also Nos. 3282, 3285, 3293–4, 3296, 3321, 3326, 3330–1, 3402, 3958, 3980.

3983. **Specimen woods Nos. 219–22.** *Suppls.* to *Wood* 19 (3–6), 1954. Each pp. 2.

Andaman Marblewood (*Diospyros marmorata*); Catalpa (*C. speciosa*); Wandoo (*Eucalyptus redunca* var. *elata*); and Totara (*Podocarpus totara*).

3984. Jay, B. A. **The 'new' timbers.** *Wood* 19 (3), 1954 (130–7).

Discusses the properties and uses of some 36 of the more promising species used in the U.K. during and since the war to replace timbers traditionally used but difficult to obtain. Includes a data sheet on dimensions, physical properties, durability and seasoning, strength and working properties.

3985. **Radiata Pine.** *Tech. Notes For. Comm.* (*Div. Wood Technol.*) *N.S.W.* 7 (2), 1953 (3–8).

Gives details of properties and uses of the timber with brief notes on distribution in N.S.W. and a botanical description.

3986. **[Japanese woods.]** *Suppls.* to *Wood Ind., Tokyo* 9 (2–3; 5–6), 1954. Each pp. [2]. [Jap.] P.R.

Photomicrographs and tabulated data on wood properties of *Chamaecyparis obtusa*, *Pinus densiflora*, *Abies sachalinensis*, and *A. firma*.

3987. Betts, H. S. **[American woods.]** *Amer. Woods U.S. For. Serv.* Revised, 1953.

(*a*) *Pinus resinosa* (pp. 4; 8 refs.); (*b*) *Tsuga canadensis* (pp. 6; 7 refs.); (*c*) *Maclura pomifera* (pp. 4; 10 refs.) [Cf. *For. Abstr.* 15 (No. 2800).]

3988. Davis, E. M. **Paper Birch utilization in the Lake States.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1953, 1953. pp. 5 + 2 photos. P.R.

Describes the use of this wood for pulp and paper, veneer industry, sawn products, and turned products.

3989. Reid, J. S. **Beech timbers: properties and uses of *Nothofagus* species.** *Inform. Ser. N.Z. For. Serv.* No. 17, 1953, pp. 38.

Identification, properties, seasoning, grading, and uses of *N. cliffortioides*, *N. fusca*, *N. menziesii*, *N. solanderi* and *N. truncata*, with suggested grading rules and some notes on hybrids. There are photomicrographs of wood of *N. fusca* and *N. menziesii*. [Cf. *For. Abstr.* 15 (No. 4010).]

3990. **[Colonial timbers.]** *Bois For. Trop.* Nos. 33; 34, 1954 (37–40; 15–8). [F.]

Botanical and silvicultural characters, wood properties and uses of (*a*) Longotra (*Cryptocarya louvelii* and *C. perrieri*); (*b*) Kaori (*Agathis lanceolata*, *A. moorei*, and *A. obtusa*).

3991. ***Timber Leaflets.*** Forest Department, Uganda. Nos. 2–16, 1954. Each pp. 2 or 3.

Cover nomenclature, habit, distribution, frequency, properties, seasoning, preservation, conversion, working qualities and uses, of the following timbers, under the suggested standard names: Alstonia (*Alstonia boonei*); Nkunya (*Manilkara cuneifolia*); Muhimbi (*Cynometra alexandri*); Mubura (*Parinari holstii*); Abura (*Mitragyna stipulosa* and *M. rubrostipulata*); White Star Apple (*Chrysophyllum albidum*); Dahoma (*Piptadenia africana* and *P. buchananii*); Antiaris (*Antiaris toxicaria*); Iroko (*Chlorophora excelsa*); Musizi (*Maesopsis eminii*); Canarium (*Canarium schweinfurthii*); African Mahogany (*Khaya anthotheca*); Gedu Nohor (*Entandrophragma angolense*), Sapele (*E. cylindricum*), Muyovu (*E. excelsum*) and Utile (*E. utile*); Celtis (*C. soyauxii*); and Nkobakoba (*Baikiaea minor*).

3992. Ferreirinha, M. P. Notas sobre as madeiras do Ultramar. 1ª Série. **[Notes on overseas species. Series 1.]** *Estud. Inform. Serv. flor. aqüíc. Portugal* No. 21–*D*3, 1954. pp. 12 + 3 plates. 9 refs. [Port.] Limited distribution.

Notes on the following timbers of Angola and Mozambique: *Chorophora excelsa*, *Bombax rhodognaphalon*, *Millettia stuhlmannii*, *Pterocarpus angolensis*, *Dalbergia melanoxylon* and *Gossweilerodendron balsamiferum*.

3993. Banerji, J. **Andaman timbers.** *Wood* 19 (5), 1954 (206–9).

Describes briefly the properties and uses of 7 of the most important species and lists 5 subsidiary species suitable for special purposes.

3994. Browne, F. G. **Standard timber names—Sarawak.** *C.F. Circular, Forest Department, Sarawak* No. 6, 1953. pp. 9. P.R.

Includes the more abundant timbers, listing scientific and principal native names and standard names recommended by the Forest Department.

3995. **Trees and timbers of Sarawak and Brunei.** *Leafl. For. Dep. Sarawak* Nos. 30–35, [1954?].

(30) Melastomaceae (*Dactylocladus stenostachys*, *Memecylon* spp. and *Pternandra* spp.) (pp. 4).

(31) Rosaceae and Rutaceae (*Angelesia splendens*, *Parastemon urophyllum*, *Parinari* spp. and *Murraya paniculata*), with notes on minor products (pp. 5).

(32) Dipterocarpaceae (ix): Selangan (all species of *Hopea* producing a wood that is only moderately hard and heavy) (pp. 7).

(33) Lauraceae (i) (*Eusideroxylon zwageri* and *E. malagangai*) (pp. 12).

(34) Dipterocarpaceae (x): White Seraya (*Parashorea* spp.) (pp. 3).

(35) Verbenaceae (*Avicennia* spp., *Vitex pubescens* and *V. peralata*) (pp. 4).

3996. Wangaard, F. F., Koehler, A., and Muschler, A. F. **Properties and uses of tropical woods, IV.** *Trop. Woods* No. 99, 1954 (1–187 + 3 plates). 107 refs.

Cf. *For. Abstr.* 14 (No. 602).

3997. Schultz, A. R. Pau-ferro no Rio Grande do Sul. **[Pau-ferro in Rio Grande do Sul.]** *Bol. Inst. tecnol. Rio Grande do Sul* No. 23, 1953. pp. 9. 15 refs. [Port.port.e.] P.R.

Of the many species which go under this name, the 4 most important found in Rio Grande do Sul are *Astronium balansae*, *Myrceugenia brevipes*, *Myrrhinium rubriflorum* and *Casuarina equisetifolia*. Botanical descriptions of each are presented with notes on the woods and their structure.

3998. Lamb, G. N. **Foreign woods, Mahogany—*Swietenia* spp.** *Wood, Chicago* 59 (2), 1954 (48, 50). P.R.

3999. Kryn, J. M. **Information leaflet. Foreign woods. Spanish Cedar, Cedro. *Cedrela* spp. Family: Meliaceae.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1948, 1953. pp. 10 + 3 tbls. 47 refs. P.R.

4000. Kryn, J. M. **Information leaflet. Foreign woods. Quaruba, Yemeri. *Vochysia* spp. Family: Vochysiaceae.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1946, 1953. pp. 7 + 2 tbls. 34 refs. P.R.

811. *Structure, Identification*

See also Nos. 3982, 3986, 3989, 4376–7.

4001. **List of publications on the growth, structure, and identification of wood.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*177, 1953. pp. 23. P.R.

4002. Eeckhout, L. **Description and identification of wood species.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1767 [*n.d.*]. pp. 21. 26 refs. Transl. by H. E. Kijlstra from *Meded. Lab. Houttechnol., Gent* No. 5, 1951. [See *For. Abstr.* 13 (No. 1489).] Limited distribution. P.R.

4003. Vihrov, V. E., and Moskaleva, V. E. O tehničeskoĭ anatomii drevesiny. **[Technology and the anatomy of wood.]** *Trud. Inst. Les.* 9, 1953 (70–88). 58 refs. [Russ.]

A review of Soviet research literature during the last 2 decades in the field of the relationship between the physical and mechanical properties of wood and its macroscopic, microscopic and submicroscopic structure. The following criteria and features are discussed: ring width, % of late wood, dimensions and volume of anatomical elements, and chemical constitution of wood elements.

4004. Poggi, A. R., and Milletti, M. La reazione del fuscello. II. Verifica delle cause che danno origine alla reazione. III. Sua estensione a materiali vari e ricerche particolari. **[The [colour] reaction of wood shavings. II. Verification of the causes of the reaction. III. Its extension to various materials and particular studies.]** *Annali di Chimica, Roma* 42, 1952 (619–32 + 6 tbls.) 8 refs.; 43, 1953 (232–41 + 41 tbls.) 1 ref. [It.it.] L.S.

Further research on this subject [cf. *For. Abstr.* 14 (No. 3736)] confirmed the previous finding that the typical colour reaction occurs only in material from plants with an appreciable content of ligno-cellulosic material. Wood of *Tamarix africana* gave some apparently anomalous reactions.

4005. Kisser, J., and Serentschy, W. Untersuchungen über die Wirkungsweise der chemischen Erweichungsmethoden von Holz. I. Mitt. Fluorwasserstoffsäure. **[The mode of action of chemical methods of softening wood. Part I. Hydrofluoric acid.]** *Repr.* from *Mikroskopie, Wien* 8 (3/4), 1953 (84–95). 23 refs. [G.g.e.] X.

The use of HF for softening sections of hard wood for microscopic purposes was investigated. Its effect is to transform the holocellulose but not the lignin. The method can therefore be used only for identification based on rough differences of structure.

4006. Johnston, D. R. **Structure drawings to 'Specimen Woods' Sheets 33–6.** *Wood* 19 (3–6), 1954 (124; 166; 205; 244).

(33) Champak (*Michelia champaca*), Pink Ivory (*Rhamnus zeyheri*), Musizi (*Maesopsis eminii*), and White Siris (*Albizzia procera*).

(34) Fijian Kauri (*Agathis vitiensis*), Lapacho (*Tabebuia ipe* and other species), Owewe (*Combretodendron africanum*) and Kakuballi (*Goupia glabra*).

(35) Courbaril (*Hymenaea courbaril*), Baramall (*Catostemma fragrans*), Japanese Ash (*Fraxinus mandshurica* and Keruing (*Dipterocarpus* spp.).

(36) Hackberry (*Celtis occidentalis*), Katu-Boda (*Cullenia excelsa*), Burma Padauk (*Pterocarpus macrocarpus*) and Gedu Nohor (*Entandrophragma angolense*).

4007. Huber, B., and Rouschal, C. Mikrophotographischer Atlas mediterraner Hölzer. **[Atlas of photomicrographs of Mediterranean woods.]** Fritz Haller Verlag, Berlin-Grunewald. 1954. pp. 107 Several refs. [G.] Price *DM*.28 [£2. 9*s*. 0*d*.]

Gives, for ca. 70 species, photomicrographs (cross-section for all, plus radial and tangential sections in many cases) and brief diagnostic descriptions of the wood. In most cases only one representative o each genus is dealt with, exceptions being made for a few of the larger genera, e.g. *Pinus*, *Quercus*. From the nature of the Mediterranean flora, many of the species illustrated are shrubby, e.g. *Ephedra procera*, *Cistus ladaniferus*, *Coronilla emerus*. Two Loranthaceae (*Loranthus europaeus* and *Viscum album*) and two monocotyledons (*Chamaerops humilis* and *Dracaena draco*) are included. A noteworthy feature is the indication, where appropriate, of the hole numbers to be punched in E. W. J. Phillips' and S. H. Clarke's card-sorting keys to softwoods and hardwoods respectively. A concluding chapter discusses briefly the general anatomy of Mediterranean woods as a whole, in comparison with those of Central Europe and the Cameroons rain-forest, with special reference to ring- and diffuse-porousness and to the correlation between ray width, ring-porousness and storeyed structure.

4008. BANNAN, M. W. **The wood structure of some Arizonan and Californian species of *Cupressus*.** *Canad. J. Bot.* 32 (1), 1954 (285–307 + 5 plates). 26 refs. O.R.S.

The microscopic wood structure of 9 *Cupressus* spp. was studied from about 700 samples. Tracheid and ray cell dimensions, size and distribution of rays, size and arrangement of pits and thickness of cell walls were found to vary in different parts of the tree. Comparisons of the data relating to homologous wood samples revealed slight interspecific differences in mean values for some structural features but the range of intraspecific variability was usually broad. No single microscopic character was discovered which alone could be considered reliable for species differentiation, but certain features such as frequency of rays, size of crossing field pits, size of tracheids and rays cells and thickness of ray cell walls may prove valuable for diagnostic purposes when used together. *From author's summary.*

4009. HAUSBRANDT, L. Badania porównawcze nad strukturą anatomiczną drewna sosen krajowych i niektórych obcych uprawianych w Polsce. [**Comparative investigation on the anatomical structure of the wood of the native and some foreign Pines grown in Poland.**] *Roczn. dendrol. polsk. Tow. bot., Warsz.* 9, 1953 (1–64). 46 refs. [Pol.pol.russ.e.]

Out of the 9 *Pinus* species occurring in Poland, *P. cembra* (1) and *P. strobus* (2) have smooth-walled ray tracheids, *P. contorta* (3), and *P. rigida* (4) are characterized by strongly developed serration on the membranes of the ray tracheids, while *P. banksiana* (5), *P. mughus* (6), *P. nigra* (7), *P. pumilio* (8) and *P. sylvestris* (9) can be placed between these two extremes. Pines (3), (4), and (5) have several semi-bordered pits in the common radial wall of ray parenchyma and a longitudinal tracheid; (6), (7), (8), and (9) have only one such pit, while the remaining species have 1 or 2. Pines (5), (6) and (9) have numerous tracheids; (1) and (2) have few.

4010. CORBETT, E. B., and ENTRICAN, A. R. **Branding the Beeches in bush and mill.** *Inform. Ser. N.Z. For. Serv.* No. 16, 1953. pp. 8.

Notes on the identification of leaves and macroscopic features of wood of *Nothofagus cliffortioides*, *N. fusca*, *N. menziesii*, *N. solanderi*, and *N. truncata*. [Cf. *For. Abstr.* 15 (No. 3989).]

4011. TUMANJAN, S. A. Sravniteljno-anatomičeskoe issledovanie drevesiny predstaviteleĭ roda *Quercus* L. [**Comparative anatomical investigation on the wood of representatives of the genus *Quercus*.**] *Trud. Inst. Les.* 9, 1953 (39–69). 24 refs. [Russ.]

Summarizes the results of a survey of over 600 Oak wood specimens belonging to 53 species (4 *Cyclobalanopsis* and 49 *Quercus*), 12 of which are native to the U.S.S.R. Tabulates the diameters, wall thicknesses, and number/sq. mm. of vessels, and the number of uniseriate rays and parenchyma cells. Other features discussed are the ray-vessel pitting and the distribution of parenchyma and vessels. Assuming that the ancestral forms were evergreen, the genus *Cyclobalanopsis* is considered to be phylogenetically younger than *Quercus* and could not be the origin of the latter; the subdivision of *Quercus* into *Erythrobalanus* and *Lepidobalanus* is accepted by the author.

4012. SHIMAJI, K. **Anatomical studies on the wood of Japanese *Quercus*. (1) The sub-genus *Lepidobalanus* (Nara group).** *Bull. Tokyo Univ. For.* No. 46, 1954 (193–210 + 12 photos). 11 refs. [E.e.jap.]

Describes the anatomical characteristics of *Q. acutissima*, *Q. variabilis*, *Q. phillyraeoides*, *Q. crispula*, *Q. aliena*, *Q. mongolica*, *Q. dentata* and *Q. serrata*. Three district groups are separated: *Aegilops*, containing *Q. acutissima* and *Q. variabilis* is ring-porous, with compound broad rays, and thick-walled rounded late-wood vessels; *Ilex*, containing *Q. phillyraeoides* is radial-porous, with aggregate broad rays; and *Prinus*, containing the 5 remaining species, ring-porous, with compound broad rays and thin-walled angular late-wood vessels. Some confusion arises when the other subgenera are examined, the *Aegilops* and *Ilex* section having wood of the *Erythrobalanus* and *Cyclobalanopsis* type while only *Prinus* has typical *Lepidobalanus* wood. An anatomical key to the 8 species is given.

4013. STARK, E. W. **Wood anatomy of the Juglandaceae indigenous to the United States.** *Sta. Bull. Ind. agric. Exp. Sta.* No. 595, 1953. pp. 42. 68 refs.

4014. LEMESLE, R., and PICHARD, Y. Les caractères histologiques du bois des Monimiacées. Difficultés d'application à la phylogénie. [**Anatomical characteristics of the wood of the Monimiaceae. Difficulties of applying them to a study of phylogeny.**] *Rev. gén. Bot.* 61 (720), 1954 (69–95). 31 refs. [F.] O.B.D.

No clear parallels could be drawn between wood structure and external morphology. In all plants there was found a mixture of primitive and advanced characters. It was not possible therefore to draw up any genealogical tree of the genera.

4015. SILLANS, R., and NORMAND, R.-D. Sur le fruit et la structure du bois de *Neochevalierodendron stephanii*. [**The fruit and wood structure of *N. stephanii*.**] *Rev. int. Bot. appl. Agric. trop.* 33 (373/374), 1953 (565–70). 5 refs. [F.] P.R.

Describes the fruit very briefly and the wood in detail. [Cf. *For. Abstr.* 13 (No. 3658).]

811.1. Anatomical Elements and Tissues

See also Nos. 3741, 3903, 4025, 4044–5, 4059, 4063, 4072, 4104, 4311, 4320.

4016. Bucher, H. Die Tertiärlamelle von Holzfasern und ihre Erscheinungsformen bei Coniferen. **[The tertiary wall of wood fibres and its forms in coniferous species.]** Habegger AG, Derendingen. 1953. pp. 53 + 112 photos. 130 refs. [G.g.e.] P.R.

A review of publications dealing with the 'tertiary wall' (the innermost layer of the secondary wall) is followed by a discussion of the known chemical, physical, morphological and technological facts pointing to the existence of a tertiary wall. A new method giving a good differentiation of it is described. Thin sections of coniferous wood are delignified repeatedly with $NaClO_2$ solution acidified with CH_3COOH; the samples are stained with concentrated Victoria Blue B in accordance with a strict prescription, and partly swell, when on the slide, under the effect of a dilute cupriethylenediamine solution. The tertiary walls of tracheids have been studied by this method in the following species: *Picea abies*, *P. glauca*, *P. mariana*, *Abies alba*, *A. balsamea*, *Pinus sylvestris*, *P. cembra*, *P. radiata*, *Pseudotsuga taxifolia*, and *Larix decidua* and the following main morphological types differentiated: membranous, close, open and complex spirals, and hyaline layers. The tertiary wall is distinct from the secondary wall and may even be separated from it in places; it continues through the mouth of the pit to line the inner surface of the pit cavity. Photomicrographs are appended.

4017. Harada, H. **[Electron-microscope investigation on the wart-like structure of conifer tracheids.]** *J. Jap. For. Soc.* 35 (12), 1953 (393–6 + 5 photos). 12 refs. [Jap.e.]

Electron-microscope investigations were made on the presence or absence of wart-like excrescences [cf. *For. Abstr.* 15 (No. 1735)] in tracheids of 29 genera and 39 species of Coniferae. Results are as follows: (1) All genera except *Pinus* are characterized by the presence or the absence of excrescences. (2) The following families and genera have them—Araucariaceae (*Araucaria*, *Agathis*), Sciadopitaceae (*Sciadopitys*), Taxodiaceae (*Cryptomeria*, *Cunninghamia*, *Taxodium* and *Sequoia*), Cupressaceae (*Chamaecyparis*, *Thuja*, *Thujopsis*, *Juniperus*, *Libocedrus* and *Cupressus*) and 4 genera of Pinaceae (*Abies*, *Tsuga*, some *Pinus* spp. and *Cedrus*. (3) The following have none—Taxaceae (*Taxus*, *Torreya* and *Cephalotaxus*), Podocarpaceae (*Podocarpus*), and 4 genera of Pinaceae (*Pseudotsuga*, *Picea*, *Larix* and some *Pinus* spp.). (4) In *Pinus*, the so-called 'hard' Pines (e.g. *P. densiflora*, *P. sylvestris*) had the excrescences and the 'soft' Pines (e.g. *P. parviflora*, *P. pentaphylla*) had not. [Results are illustrated by photomicrographs with English legends.] *From author's summary.*

4018. Harada, H. **[Electron-microscope observations on xylem ray cells of conifers.]** *J. Jap. For. Soc.* 35 (6), 1953 (194–9). 10 refs. [Jap.e.]

An examination was made of the fine structure of the pit membrane of a half-bordered or simple pit pair and of fibrillar orientation in the cell wall of ray parenchyma from early wood of some Japanese species. Results are illustrated from *Chamaecyparis obtusa* and *Pinus densiflora* by photomicrographs with English legends, and discussed.

4019. Wardrop, A. B. **The intermicellar system in cellulose fibres.** *Biochim. biophys. Acta* 13 (2), 1954 (306–7). 4 refs. [E.] [Commonwealth Scientific and Industrial Research Organisation, Melbourne.] O.R.S.

Fibres of *Picea* sp. (early and late wood), *Eucalyptus regnans* (late wood), and flax, delignified or untreated, were treated with a solution of Au chloride and examined in the electron microscope. In wood, the maximum scattering angle was less in Au-impregnated than in untreated specimens, confirming that the deposition of Au swells the fibres and gives values for the intermicellar spaces that are too high although giving some indication of their size. Specimens delignified before deposition of Au gave higher values for apparent crystal size. Values of apparent crystal size in delignified and untreated fibres are tabulated.

4020. Asunmaa, S. **A note on the electron microscope study of cellulose fibres in ultra-thin sections after treatment with thallous ethylate (an attempt to produce a specific electron staining).** *Svensk PappTidn.* 57 (10), 1954 (367–8 + 6 photos). 16 refs. [E.e.g.sw.] P.R.

Results are illustrated in photomicrographs of holocellulose fibres of *Picea abies*.

4021. Huhrjanskaja, T. P. Vlijanie pressovanija na strukturu drevesiny osiny i sosny. **[Effect of compression on the wood structure of Aspen and Pine.]** *Trud. Inst. Les.* 9, 1953 (444–7 + 3 photos). [Russ.]

X-ray spectra showed that the cellulose structure was the same in both species and does not change until the volume is reduced by 40%. The cellulose is more orientated in late wood than in early. Compression increases the degree of orientation in Pine wood irrespective of direction, while in Aspen the change of orientation depends on the direction of compression.

4022. Parès, Y. Transformation des éléments conducteurs ligneux des tiges chez les Rubiacées et quelques autres familles. **[Transformation of the conducting elements in the stemwood of the Rubiaceae and some other families.]** *Rec. Lab. Bot. Univ. Montpellier* (*Sér. bot.*) No. 6, 1953 (115–26). 7 refs. [F.]

From the studies described, the following conclusions are drawn: (1) Annular pitting represents the primitive type which gave rise to other forms of pitting, both simple and bordered. (2) Alternate pitting may also lead to circular bordered pitting. (3) Scalariform pitting is anterior to circular bordered pitting and may give rise to it by fragmentation. (4) Circular bordered pitting sometimes forms without the intermediary of scalariform pitting; when this occurs it is no doubt as a result of telescoping the process of development by suppressing some of the intermediate stages.

4023. Messeri, A. Alcuni dati sulla struttura submicroscopica delle fibre di tensione di un campione di legno di pioppo. **[Some data on the submicroscopic structure of tension-wood fibres from a sample of Poplar wood.]** *Repr.* from *Atti dell' Accademia Nazionale dei Lincei* (*Ser. 8*), *Roma* 14 (2), 1953 (315–22 + plate). 6 refs. [It.] X.

The subject of this investigation was a sample of wood from a 7-year-old Poplar plantation at Casale Monferrato, identified as '*Populus euramericana* Guinier, Clone 214'. Reaction wood is of common occurrence in this plantation. The examination was made by polariscope and radiography. It was found that the tension fibres had an acute spiral texture (8°–10°), homogeneous in each layer of the wall, but differing in the different layers because of the greater rigidity of the outer wall compared with the inner. The outer wall also has a more stable cellulose texture than the inner, losing its birefringence with difficulty, even after swelling, while the inner wall loses it easily. Long and slow swelling in water alters the orientation of the cellulose micelles of the wall, rendering them more or less parallel with the longitudinal axis of the fibre. Rapid swelling by NaOH, on the other hand, seems not to alter the orientation of the cellulose spirals.

811.2. Special Features and Abnormal Structure

See Nos. 4023, 4084, 4297, 4300.

811.4. Growth Rings. Early and Late Wood

4024. Kisser, J., and Steininger, A. Die mikroskopischen Grundlagen des Schwefelsäure-Korrosionsverfahrens zur Bestimmung der Früh- und Spätholzanteile von Nadelhölzern. **[The microscopic basis of the sulphuric-acid corrosion method of distinguishing early and late wood in coniferous timbers.]** *Repr.* from *Mikroskopie*, *Wien* 8 (9/10), 1953 (313–9). 8 refs. [G.g.e.] X.

Cf. *For. Abstr.* 12 (No. 2984).

4025. Vihrov, V. E. Stroenie i fiziko-mehaničeskie svoĭstva ranneĭ i pozdneĭ drevesiny duba. **[Structure and physico-mechanical properties of early and late wood of Oak.]** *Trud. Inst. Les.* 9, 1953 (29–38). 14 refs. [Russ.]

Presents tabulated and graphed results of investigations. Significant differences were established on large populations (100–1000) between early wood (e.w.) and late wood (l.w.) of *Quercus robur* in: tangential and radial diam. of vessels, length of vessel members, % of vessels, fibres, parenchyma and rays. No significant differences were found in tracheid length. The following physical and mechanical properties were tested on specimens measuring 0·5–1 × 4 × 35 mm.: density, volume shrinkage, linear shrinkage, static bending strength, limit of plastic flow in static bending, and tensile strength||. The strength figures for e.w. were roughly $\frac{1}{2}$ those of l.w.; shrinkage for e.w. was roughly $\frac{4}{5}$ of that for l.w.

811.5. Sapwood and Heartwood

See also No. 4298.

4026. Kurotori, S. **[Studies on the 'white rings' [occurring at the boundary between heartwood and sapwood] of Sugi. (1).]** *J. Jap. For. Soc.* 36 (1), 1954 (15–9). 1 ref. [Jap.jap.e.]

White rings between heartwood (h.w.) and sapwood (s.w.) of *Cryptomeria japonica* were found to be 2–11 mm. wide and to contain 1–3 annual rings. They were clearly evident in green wood but were difficult to distinguish from the s.w. in dry wood. In green wood the moisture content of the h.w. and of the white rings (average m.c. 45·2 and 45·4% respectively) was much below that of the s.w. (148·7%) but in dry wood differences were slight (13·8, 12·7 and 12·0% respectively). There was little difference in oven-dry density between h.w., s.w. and white rings. Results of tests on water absorption and creosote penetration are given in tables and a graph [with English text]. The proportional figures for water absorption are: s.w. 100%, white rings 25%, and h.w. 10%. From these results the white rings are assumed to be transitional between sapwood and heartwood. [Cf. *For. Abstr.* 15 (Nos. 631, 1738).] *From author's summary.*

4027. Wallin, W. B. **Wetwood in Balsam Poplar.** *Minn. For. Note* No. 28, 1954. pp. 2.

Wetwood appears in Balsam Poplar [*Populus balsamifera*] as an irregular zone contained in the xylem of the tree between the normal sapwood and normal heartwood. It is characterized by a darkened appearance and a water-soaked condition and is chemically distinguished from sapwood (slightly acid) and heartwood (essentially neutral) by being slightly basic. The present study, based on 18 trees from two areas, was made to determine whether differences in physical properties exist between wetwood (*w*), sapwood (*s*) and heartwood (*h*). The following conclusions were drawn: (1) *w* contained more water per unit volume of wood than *s* or *h*, and *h* contained more water than *s*; (2) there were no differences in sp. gr. between the three; (3) *h* was weaker than *s* in both compression and toughness (no tests made on *w*); (4) bacteria were more prevalent in *w* (92·5% of all isolations) than in *h* (68·3%) or *s* (54·4%).

812. *Physical and Mechanical Properties*

See also Nos. 3362, 3984, 4003, 4025, 4027, 4266, 4294.

4028. Vipper, P. B. Nekotorye fiziko-mehaničeskie svoĭstva drevesiny hvoĭnyh porod u jugo-vostočnoĭ granicy ih rasprostranenija v Zabaĭkalje. **[Some physical and mechanical properties of wood of conifers in Transbaikalia, near the south-eastern limit of their occurrence.]** *Trud. Inst. Les.* 9, 1953 (415–8). [Russ.]

Tabulates the number of growth rings, % of latewood, density at 15% m.c., shrinkage, compression strength and modulus of elasticity for *Pinus sibirica*, *P. sylvestris*, *Larix sibirica* and *Picea obovata*.

4029. Vihrov, V. E. Fiziko-mehaničeskie svoĭstva drevesiny jasenja obyknovennogo (*Fraxinus excelsior* L.). **[Physical and mechanical properties of the wood of *F. excelsior* [from the Tellerman forest, Voronezh].]** *Trud. Inst. Les.* 9, 1953 (423–30). 11 refs. [Russ.]

4030. Vihrov, V. E. Fiziko-mehaničeskie svoĭstva drevesiny iljma (*Ulmus glabra* Mill.).

[Physical and mechanical properties of the wood of *U. glabra* [from the Tellerman forest, Voronezh].] *Trud. Inst. Les.* 9, 1953 (419–22). 4 refs. [Russ.]

4031. CAMPREDON, J., and VILLIÈRE, A. Études sur le bois de peuplier Robusta. **[Studies on the wood of × *Populus robusta*.]** *Rev. for. franç.* 6 (5), 1954 (311–5). [F.]

A preliminary report on studies made by the Centre Technique du Bois at the suggestion of the International Poplar Commission, in order to determine standard methods of testing Poplar wood. The study was made on 14 logs of the hybrid *P. robusta* from 7 trees of different provenances and included sawing, seasoning and veneer peeling as well as mechanical strength tests. [Cf. *For. Abstr.* 15 (Nos. 4060, 4080).]

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

4032. MAKU, T. **[Relation between specific gravity and thermal conductivity of wood.]** *Wood Res., Kyoto* No. 9, 1952 (1–13). 14 refs. [Jap.jap.e.]

Presents formulae for thermal conductivity in terms of dry density.

4033. **Fire-test methods used in research at the Forest Products Laboratory**. *Rep. U.S. For. Prod. Lab., Madison* No. 1443, 1953. pp. 16 + 11 photos + 3 dgms. + 1 gph. + 11 tbls. 16 refs. P.R.

Illustrated description of 9 flame-spread and 2 flame-penetration testing methods, with a number of tabulated results.

4034. JENTZSCH, H., and JELITTO, K. Neue Holzentzündungsversuche mit dem Zündwertprüfer. **[New ignition tests with the aid of the [Jentzsch] ignition tester.]** *Holz Roh- u. Werkstoff* 11 (12), 1953 (462–6). 6 refs. [G.g.] P.R.

Results of further tests [cf. *For. Abstr.* 14 (No. 3707)] made on 17 European and tropical woods and 6 composite wood panels (insulation and fibreboard, plywood, laminated wood, improved wood etc.) are tabulated and graphed. The concept of the 'Zeitgaszahl' ('time/gas value') is introduced, viz. the loss in weight (volatile constituents) per sec. observed in a wood sample at a given temperature and without an extra O supply; the standard temperatures used were 200, 300 and 400° C., the weight being checked every minute for 10 minutes. At 200°, only the moisture (10%) was lost, 2–3 min. being required for lightweight woods and as long as 7 min. for Bongossi [*Lophira procera*], but at 300°, the loss was ca. 50% after 10 min., for Bongossi 24%. At 400°, the samples undergo immediate decomposition and ignite when the loss in weight reaches 70–80%. It is claimed that the flash point and fire point are of little value, whereas the self-ignition point *Szp* and upper ignition value Z_0, and the ignition delay *W* in sec. (at 320° with O current equivalent to 400 bubbles/min.) constitute sound criteria of the ignitability of wood. An empirical index is suggested:

$$V_z = \frac{[43500 - (1{\cdot}5\ Szp + 2{\cdot}4\ Z_0 + 3{\cdot}2\ W)]}{100}$$

This gives values of 84·5 for Balsa, 2 for Bongossi, 36 for Oak, and 59·5 for fibreboard.

4035. JAIN, J. C. **Does preservative treatment increase the inflammability of wood?** *Quarterly News Bulletin of the Timber Dryers' and Preservers' Association of India, Dehra Dun* 1 (2), 1953 (7–10). 6 refs. P.R.

Results are graphed of % weight loss determined after exposure to standard flame for 2 minutes for 0·8 × 0·8 × 10·0 cm. specimens of *Pinus longifolia* and *Bombax malabaricum*, impregnated with (1) creosote/fuel-oil 1 : 1 mixture; (2) Cu naphthenate and (3) pentachlorophenol, dissolved in 'powerine'; (4) ASCU; (5) $ZnCl_2$, and (6) Boliden salts. The specimens were dried to allow the solvent to evaporate before testing. In no case did the preservative treatment increase inflammability, and $ZnCl_2$ (and, to a lesser degree, Boliden salts) actually increased the resistance of wood to fire.

4036. NAKATO, K., and KADITA, S. **[The dielectric constant of oven-dried wood.]** *J. Jap. For. Soc.* 36 (4), 1954 (95–100). 11 refs. [Jap.e.]

Measurements were made on *Chamaecyparis obtusa* and *Quercus crispula.* Results are given in tables [with English legends]. *From authors' summary.*

4037. BAŽENOV, V. A. Pjezoèlektričeskiĭ effekt v drevesine. **[Piezoelectric effect in wood.]** *Trud. Inst. Les.* 9, 1953 (281–314). 15 refs. [Russ.]

Presents the results of experimental work done by the author and co-workers [cf. Baženov and Konstantinova, *Dokl. Akad. Nauk SSSR* 71 (2), 1950]. Wooden piezo-elements for bending tests consisted of square plates (50 × 50 × 1–4 mm.), dried to constant weight at 100° C., protected against re-humidification by a coat of beeswax/rosin (2/1) mixture, and fitted with 2 metal electrodes applied to both square faces: a metal foil, and a 1-mm. steel plate. The wooden plates were cut: (1) with the grain direction || to one side of the square face, so that the square faces were radial sections; (2) with the square faces forming tangential sections, the thickness in the centre of the square coinciding with the stem radius; (3) intermediate between (1) and (2), and (4) ⊥ to the grain (transverse sections). The piezo-plate was deflected by applying a load to its centre, while two supports were placed alternately under opposite ends of the plate, viz. in corners or in the centre of sides, thus giving 4 possible arrangements. No electric polarization was observed for plates of type (4). Results obtained with 9 plates made of Pine with a spiral-grain angle of 15° showed that: the relationship between deflection and electrification is nearly linear; Pine wood plates of types (1) and (2) showed the same degree of polarization, their thickness having no effect on the density of charge. Wooden piezo-elements for compression tests had the form of a cube or rectangular prism. The modulus of piezo-electricity of wood was determined by synchronizing the compression machine graph with the process of polarization. This modulus is defined as

$$d_{ik} = \frac{2VC}{kS_{el}\epsilon E}$$

where *V* is the polarization potential, *C* = capacity of the charged system (in picofarads), *k* = 333 (constant coefficient), S_{el} = area of the electrode in sq. cm., t = mechanical stress in dyn./sq. cm., E = modulus of elasticity in dyn./sq. cm., and ϵ = the relative deformation. It was found that differences in the piezo-electric modulus of wood in different directions or at different temperatures can be explained by corresponding changes in the modulus of elasticity. The variation of piezo-electric polarization during the compression of wood was studied in some detail. The role of cellulose elements in the generation of the piezo-electric effect in wood is stressed and discussed.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 4063, 4065, 4071, 4235, 4239, 4260, 4276, 4289, 4338, 4348–51.

4038. Edwards, N. C., and Kingston, R. S. T. **Sub-project T.P.3–1. Electrical moisture meters. Progress report No. 48 (4th report). Experiment T.P. 3–1/5. The effect of casein glue and depth of electrode penetration on the readings of an electrical resistance moisture meter used for testing plywood.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 6 + 1 photo + 1 dgm. + 1 gph. 3 refs. P.R.

The relationships between moisture-meter reading and moisture content were obtained for two probe penetrations, with and without glue, over a m.c. range of 8–18%.

4039. Perem, E. **Determination of the fibre saturation point of wood by centrifuging.** *J. For. Prod. Res. Soc.* 4 (2), 1954 (77–81). 10 refs. [Forest Products Laboratory of Canada, Ottawa.]

Characteristic reproducible moisture-content values were obtained in sapwood specimens of *Pinus resinosa* and *Picea glauca* after applying centrifugal force of 10,000 times gravity or higher (up to 36,000 times gravity) for periods of over 2 hr. to samples with dimensions of ca. ½-in. cubes. The m.c. so established may be considered as the fibre-saturation point. The free water could not be so easily removed from heartwood specimens. The longest centrifuging period applied, 5 hr. at 10,000–35,000 times gravity, failed to produce equilibrium m.c. in heartwood.

4040. Ivanov, Ju. M. Pervoe issledovanie javlenija nabuhanija drevesiny russkim fizikom Vasiliem Petrovym. **[The first investigation of the phenomenon of swelling of wood by the Russian physicist V. Petrov.]** *Trud. Inst. Les.* 9, 1953 (229–35). 1 ref. [Russ.]

Discusses the paper presented by Petrov to the Academy of Sciences of St. Petersburg in 1813 and published in 1819, under the title 'Investigation into the causes of stones being cracked by dry-wood wedges wetted with water, and of water-filled metallic tubes being cracked by peas or beans placed in the tubes which were then tightly closed', and presents the results of Pavlov's measurements in modern units and form. The tests were done on specimens of Pine, Fir, Oak, Birch, Alder, and Lime wood, and the tabulated results give weight of specimen before test, increase of weight during test, volume of water absorbed, volume of air displaced, increase of thickness after test, and sp. gr. before test.

4041. Ivanov, Ju. M. O davlenii nabuhanija drevesiny. **[Swelling pressure of wood.]** *Trud. Inst. Les.* 9, 1953 (236–49). 3 refs. [Russ.]

[Cf. *For. Abstr.* 13 (No. 3318).] Describes and illustrates an instrument devised by the author to measure the deflection of a metal lever caused by the swelling of test pieces, the deflection being calibrated against load. A pair of 8 × 13 × 11-mm. test specimens are fixed in a vessel between its metal base and a metal cover-plate surmounted by a triangular prism; the horizontal edge of the prism is in contact with a horizontal lever kept in position by its fulcrum and a setting screw put between the fulcrum and the prism, near the latter. The swelling of the test pieces, when water is put into the vessel, is recorded as deflection of the lever. It was found that: (1) the swelling pressure was, for both Pine sap- and heartwood, greater tangentially than radially; (2) the swelling pressure for the species tested (Pine, Larch, Spruce, Birch, Aspen, Alder, Beech, Ash and Oak) was always less than the limit of plastic flow (from compression tests) for fully saturated pieces; (3) the final (maximum) value of swelling pressure for Pine test pieces 0·8 × 1·3 × 1·1 cm. was reached for sapwood in ca. 2 min. and for heartwood in ca. 50–60 min.; (4) the m.c. of oven-dry Pine sapwood when immersed in water reached fibre-saturation point after ca. 6 sec., when the swelling deformation was 10–12% and the swelling pressure 5–6% of their final values; the corresponding period for heartwood was 12 min.; (5) Aspen wood, steamed, compressed to ca. 50% of original volume, soaked in water, and oven-dried, showed the same swelling pressure as untreated wood; and (6) 'fatigued' Pine sapwood (air- or oven-dry wood compressed beyond the limit of plastic flow in both the tangential and radial direction, then soaked and oven-dried) showed, when soaked, a smaller swelling pressure than wood not so treated. [No provision was made for the free escape of air from the test pieces.]

4042. Kitamura, H., and Ishizuki, Y. **[Studies on the physical properties of Bamboo. (IV) The relationship between the amount of shrinkage and the thickness of the test piece.]** *J. Jap. For. Soc.* 35 (12), 1953 (388–92). [Jap.jap.e.]

Blocks 4–4·5 mm. × 30 mm. and 2, 3, 4, 5 or 6 mm. thick in the tangential direction were sawn from air-seasoned *Phyllostachys pubescens*. The blocks were soaked to saturation and then exposed in a desiccator to a temperature of 48° C. and a relative humidity of 0·0%. Shrinkage % after 24 hr. for the blocks in order from 2 to 6 mm. was 5·795, 5·680, 5·433, 5·200 and 4·182% respectively. Times at which the blocks showed 1% shrinkage were 50, 40, 45, 85 and 120 min. respectively. The formula for the time when 2% shrinkage was reached is $t = 8{\cdot}8^2 - 28{\cdot}8x + 112{\cdot}5$ when t = time in minutes and x thickness in mm. The formulae for the time to reach 3% shrinkage are $t = 60{\cdot}x$ when $x = 2, 3,$ or 4 mm., and $t = 60{\cdot}x + 6$ when $x = 5$ or 6 mm. [Results are shown in tables and graphs with some English legends.] *From authors' summary.*

4043. Vihrov, V. E. Fizičeskie svoĭstva drevesiny nekotoryh derevjev i kustarnikov lesostepnoĭ zony. [**Physical properties of the wood of some trees and shrubs of the forest-steppe zone [in Russia].**] *Trud. Inst. Les.* 9, 1953 (250–4). 2 refs. [Russ.]

Tabulates the following properties for 22 broad-leaved tree and shrub species (for both sapwood and heartwood): moisture content of freshly-felled wood (butt end, mid-height, and average), green density, air-dry density (15% m.c.), oven-dry density, and coefficient of volume shrinkage. Suggests the following terms and definitions: (1) for a.d. density (15% m.c.): very light, < 0·4; light, 0·41–0·5; moderately light, 0·51–0·6; moderately heavy, 0·61–0·7; heavy, 0·71–0·8, and very heavy, > 0·8 g./c.c.; (2) for the coefficient of volume shrinkage: little shrinkage, < 0·45; moderate shrinkage, 0·46–0·55; marked shrinkage, 0·56–0·65, and very marked shrinkage, > 0·65%.

4044. Kazita, S., Nakato, K., and Namiki, Y. **[The cause of anisotropic shrinkage and swelling of wood. IV. The relationship between the rays and anisotropic shrinkage.]** *J. Jap. For. Soc.* 35 (2), 1953 (51–6). 8 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 14 (No. 3714).] The following results [shown in tables with English legends] were obtained from statistical analysis of measurements on small sapwood blocks of *Cryptomeria japonica*: (1) A correlation of ray volume (V_R) with anisotropic shrinkage (tangential/radial shrinkage in cross-section) existed but was negligible. (2) The restraining effect of the rays in radial shrinkage was also negligible. (3) The correlation coefficient of V_R and tangential shrinkage was positive. *From authors' summary.*

4045. McIntosh, D. C. **Some aspects of the influence of rays on the shrinkage of wood.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (39–42). 9 refs.

Transverse sections about 80μ thick were cut from small saturated blocks of *Quercus borealis*, measured while saturated and then allowed to dry without restriction in air and over P_2O_5. In sections with a broad ray on each radial edge the wood between the rays shrank radially more than the rays but less than wood in sections from which all broad rays had been detached; statistical comparison showed highly significant differences in the mean radial shrinkage values for these 3 groups of test material. The results show clearly that the broad rays not only shrank less radially than the surrounding wood but reduced the shrinkage of the wood in a radial direction. Photomicrographs of the distortion that occurs when sections containing a broad ray attached to the surrounding wood or partly detached from it are allowed to dry, illustrate the smaller amount of shrinkage in the broad rays. Results of further tests to determine the effect on shrinkage of the fine rays contained in the wood between the broad rays will be published later. [Cf. *For. Abstr.* 13 (No. 4183).]

4046. Moskaleva, V. E. Nabuhanie mikrosrezov estestvennoĭ i pressovannoĭ drevesiny sosny v židkostjah različnoĭ poljarnosti. **[Swelling of micro-sections of natural and compressed Pine wood in liquids of different polarity.]** *Trud. Inst. Les.* 9, 1953 (121–6). 4 refs. [Russ.russ.]

Experiments have confirmed the relationship between the electro-colloidal properties of natural and compressed Pine wood and its swelling. Out of the 4 simplest saturated fatty acids, the greatest swelling of Pine sections was observed in HCOOH (dielectric constant 58), the smallest in butyric acid (dielectric constant 2·9). The tangential walls of late tracheids of Pine swell more than the radial walls.

4047. McNabb, A., and Taylor, W. B. **Some theory relating to the diffusion of chemicals in green timber.** *N.Z. J. Sci. Technol.* 35*B* (1), 1953 (113–26). 5 refs. P.R.

Some relationships are derived for the distribution of concentration of a chemical at any time when an aqueous chemical solution is applied to the surface of green timber; these relationships are based on certain assumptions regarding the process of absorption. The relationships obtained provide a theoretical basis for an empirical relationship found by Harrow [see *For. Abstr.* 14 (No. 2781)].

4048. Konishi, Y., Kishima, T., and Yamamoto, T. **[Study on penetrations of liquids into wood by fluorescence.]** *Wood Res., Kyoto* No. 11, 1953 (1–4). [Jap.e.]

When the section of wood which had been soaked in aqueous β-methyl-umbelliferon was irradiated with ultra-violet light the part penetrated by water emitted a strong fluorescence. This is illustrated by photomicrographs. *From authors' summary.*

4049. Konishi, Y., Kishima, T., and Yamamoto, T. **Study on the liquid penetration into wood by fluorescence.** *Transl. For. Prod. Lab., Can.* No. 72, 1954. pp. 2. Transl. from *Wood Res., Kyoto* No. 11, 1953 (1–4).

Cf. preceding abstract.

4050. Suzuki, Y., and Aoyama, T. **[Studies on Bamboo (X). Diffusion of moisture in Bamboo. [*Phyllostachys pubescens*].]** *Bull. Tokyo Univ. For.* No. 46, 1954 (211–23). 7 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 15 (No. 650).] Test results are given in tables and graphs [with English legends], and peculiarities in the anatomical structure causing slower diffusion than in wood are discussed.

4051. Arcihovskaja, N. V. Issledovanie vlagoprovodnosti drevesiny. **[Investigation of the moisture conductivity of wood.]** *Trud. Inst. Les.* 9, 1953 (127–57). 13 refs. [Russ.russ.]

Describes new methods of: (1) investigating the moisture conductivity of wood for a constant rate of moisture flow, and (2) determining the relative air humidity (r.h.) to an accuracy of ± 3% by measuring the moisture capacity of filter paper. Increase of the moisture flow rate is related to the gradual humidification of specimens; its decrease, to their drying. During the first 2 months, the moisture flow rate in specimens with a marked initial moisture content is considerably higher than in drier specimens; the difference disappears in the third month. When the r.h. on one side was 100%, the moisture flow rate was found to vary inversely as the r.h. on the other face. Moisture distribution curves in specimens are slightly convex up to 14–15% m.c., above this figure they straighten out or even become concave.

4052. Baženov, V. A. Vodopronicaemostj drevesiny. **[Permeability of wood to water.]** *Trud. Inst. Les.* 9, 1953 (186–204). 6 refs. [Russ.]

To test water permeability under a hydrostatic pressure of, say, 1 m. water-head, cylindrical wood specimens of 48 mm. diam. were covered on the peripheral surface with an impermeable substance, and placed in a metal vessel with rubber washers, connecting one end tightly with a graduated vertical glass tube. The amount of water evaporated from the bottom surface of the specimen was determined by absorption in a hygroscopic salt. If actual water appeared at the bottom surface, only the volume change in the tube was taken into consideration. No water was observed to pass through Oak specimens ⊥ grain (thickness 2–30 mm.) at air humidities of 33 and 77%. Beech and Maple behaved like Oak at low water pressures; Birch and Pine sapwood let liquid water through. Results of water absorption and water permeability are graphed and tabulated for the above species. The use of the following characteristics for water permeability is recommended: intensity of water conduction through a standard specimen at equilibrium and at the specimen's average moisture content, and, as secondary characteristics, the curves of water permeability and of moisture distribution across the specimen.

4053. Baženov, V. A., and Moskaleva, V. E. O pronicaemosti drevesiny zaboloni i jadra sosny židkostjami i o vozmožnostjah ee regulirovanija. **[Permeability of Pine sapwood and heartwood to liquids and possibilities of its control.]** *Trud. Inst. Les.* 9, 1953 (205–15 + 3 photos). 11 refs. [Russ.]

The sapwood portion of dried Pine, with aspirated tracheid pits, was found to conduct water and solutions across the cells; hence the aspiration of the torus in Pine heartwood cannot be the only cause of impermeability to water. Pine heartwood specimens were extracted with different resin solvents, and then tested for permeability to water, both capillary (*a*) and diffusion (*b*). Treatment of oven-dry wood with kerosene failed to improve *a* and even decreased *b*; extraction with *iso*-propanol thrice for 2 hours did not alter *a* or *b*. When air-dry heartwood was extracted with *iso*-propanol for 22 or 35½ hours (corresponding to removal of 7–7·5% of extractives), it was found to have capillary permeability to NaCl solution and coloured water in the same degree as sapwood. It was proved that, after the extraction, the resin ducts previously present in the (predominantly late) tracheids disappeared. Water is absorbed by both early and late wood, the amount of absorbed water increasing as the density of wood decreases. The cell walls contain capillary systems.

4054. Baženov, V. A. Issledovanie drevesiny sosny splavnoĭ i suhoputnoĭ dostavok na pronicaemostj nasyščennym rastvorom povarennoĭ soli. **[Research on the permeability to saturated NaCl solution of Pine wood transported by water and by land.]** *Trud. Inst. Les.* 9, 1953 (216–28). 2 refs. [Russ.]

Tabulated and graphed results are presented. Blue-stained Pine sapwood is very permeable to NaCl solution (equally so radially and tangentially). Healthy sapwood is more permeable radially than tangentially, and wood that has been transported by water more than wood transported by land. When impregnated with liquid paraffin, blue-stained Pine sapwood becomes as little permeable to NaCl solution as healthy heartwood. The use of liquid paraffin is recommended for impregnating barrels in which salt fish in brine are packed.

4055. **Some influences of ultrasonic vibrations on wood. Part I. The effect of supersonics on improving treatability of wood.** *Report, Timber Engineering Co., Washington* (*Naval Research Contract N9onr-87000*) No. 1, [1949] (1–34). 14 refs. P.R.

Tests of treatable woods with vibrations of frequency range of 20–21 kilocycles and 1/10 KW power indicated a definite increase of free water flow due to the vibrational energy having no measurable pressure. In addition, there was a distinct persistence effect, the free water flow continuing for some time after the power had been turned off. The study of free water flow in resistant hardwoods has been limited to exploratory tests; these indicated that with the frequency range used the increase in free water flow was inappreciable. On the other hand, a definite acceleration in the rate of diffusion was found in some tests. The study to date has been limited to one narrow frequency range and by the low power density employed. *From authors' summary.*

812.3. Density. Specific Gravity. Buoyancy

See also Nos. 4032, 4043, 4063, 4065–6.

4056. Reichert, T. **Process and means for determining the true specific gravity of wood.** *U.S. Patent* No. 2,668,439, Feb. 9, 1954. pp. 6 + 6 dgms. 2 refs. P.O.

A disk-like piece of wood free from air-pockets and knots is boiled in water, immersed in cold water in the absence of air, the excess of water removed by absorption, and the sp. gr. determined xylometrically.

4057. Heinrichs, J. F. **Rapid specific gravity determinations.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (68).

To determine the volume of a wood sample, it is weighed first in air and then immersed in water; if it tends to float the volume (in c.c.) is obtained from the sum of the two weights in g. If it tends to sink, the volume is obtained from the difference of the two weights. A balance with a direct-reading scale is used.

4058. Susmel, L. Ricerche sul peso specifico del legno *Eucalyptus rostrata* dell' Agro Pontino. **[Research on the density of *E. rostrata* wood from the Agro Pontino.]** *Ann. Accad. ital. Sci. for.* 1, 1953 (117–46). 7 refs. [It.f.]

The results of this study have already been published briefly [cf. *For. Abstr.* 13 (No. 3322)]; the present paper gives also the experimental data and observations.

4059. Ferreirinha, M. P. Sobre a correlação entre a densidade do lenho e as dimensões das fibras nas folhosas tropicais. **[The correlation between wood density and fibre dimensions in tropical broad-leaved species.]** *Garcia de Orta, Lisboa* 1 (1), 1953 (43–51). 9 refs. [Port.f.]

Fifty-one specimens belonging to 33 species were examined for (1) density of (*a*) air-dry and (*b*) oven-dry wood, (2) average fibre width, and (3) average fibre length. The author found the following significant correlations between density and fibre size: for width, $r = -0{\cdot}729$ and for length $r = -0{\cdot}319$.

812.7. Strength Properties

See also Nos. 4112, 4115, 4136, 4139–40, 4183–4, 4189, 4198–9, 4201, 4203, 4207, 4337.

4060. **Report of Second Conference on mechanical wood technology, 6–18 August 1951. Igls, Austria.** FAO, Rome. No. *FAO*/52/5/2789, [1952]. pp. 71 + 3 photos + 8 dgms. + 1 gph.

Reports include: (1) recommended methods of test for evaluating the properties of fibre building boards; (2) proposed standard procedure for the mechanical testing of veneer, plywood and allied materials; (3) progress reports on timber tests; (4) stress-grading of structural timber; and (5) nomenclature of commercial timbers; with an appendix: Mechanical and industrial testing of Poplar wood, by G. Giordano [cf. *For. Abstr.* 15 (No. 4031)].

4061. Kollmann, F. **The dependence of some mechanical properties of woods on time, notching and temperature. 1. The influence of time on the mechanical properties of wood. II. The importance of notching in relation to wood strength. III. The influence of temperature on some mechanical properties of woods.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2017, 1953. pp. 48 + many dgms., gphs., and tbls. 59 refs. Transl. from *Holz Roh- u. Werkstoff* 10 (5–7), 1952 (187–97; 239–44; 269–78). [See *For. Abstr.* 14 (Nos. 648–50).] Limited distribution.

4062. Norén, B. Mätning av töjning och krypning i trä. **[The measurement of strain and creep in wood.]** *Medd. svenska TräforsknInst. (Trätekn. Avd.)* No. 29*B*, 1952. pp. 39. 8 refs. [Sw.e.] P.R.

Reports on tests on a Swedish wire resistance strain gauge (illustrated).

4063. Horioka, K. **[Research on improving wood. 1st report. Study of the properties of wood with special reference to its improvement.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (15–66). 36 refs. [Jap.jap.e.]

Tests were made on compression strength (σ_c), modulus of rupture (σ_B) and Young's modulus (E_B) in static bending, tensile strength (σ_T), Young's modulus in tension (E_T), impact bending strength (σ_I), shear strength (σ_S) and shrinkage, of 35 hardwood and softwood species native to Japan and *Chamaecyparis formosensis* native to Taiwan (Formosa). Test methods are described in detail and results tabulated. Strength properties are related to density at 15% m.c. (γ_{15}) or air-dry ($\gamma_{a.d.}$ in graphs, the following (generally straight-line) relationships being derived:

$$\sigma_C = 844{\cdot}5\,\gamma_{15} \text{ kg./sq. cm.,}$$
$$\sigma_B = 1600\,\gamma_{15}^{1.31} \text{ kg./sq. cm.,}$$
$$E_B = 177{,}000\,\gamma_{15} \text{ kg./sq. cm.,}$$
$$\sigma_T = 1890\,\gamma_{15} \text{ kg./sq. cm.,}$$
$$E_T = 248{,}000\,\gamma_{15} \text{ kg./sq. cm.,}$$
$$\sigma_I = 1{\cdot}9\,\gamma_{a.d.}^{1.28} \text{ kg./sq. cm.,}$$

and $\sigma_S = 244\,\gamma_{15}$ kg./sq. cm.

The mean tangential and radial shrinkage/density relation can be expressed as $\alpha_T = 0{\cdot}53\ \gamma_{15}$ (%) and $\alpha_R = 0{\cdot}30\ \gamma_{15}$ (%). Static and kinetic indexes obtained by the formulae $I_C = \frac{\sigma_C}{100\gamma}$ and $I_I = \frac{\sigma_I}{\gamma_{a.d.}^{2}}$ are used to classify the woods into the following groups (1) I_C and I_I excellent—*Chamaecyparis obtusa, Picea jezoensis, C. formosensis, Pinus densiflora, P. thunbergii*, and *Thujopsis dolabrata*. (2) I_C excellent, I_I medium—*Abies veitchii, Larix leptolepis, Betula maximowicziana, B. grossa, Aesculus turbinata, Cercidiphyllum japonicum, Cinnamomum camphora, Fagus crenata, Juglans allardiana* var. *acuta, Machilus thunbergii, Magnolia obovata, Tilia japonica, Fraxinus mandshurica, Kalopanax pictum, Quercus crispula, Zelkova serrata* and *Castanopsis cuspidata* var. *sieboldii*; (3) I_C medium, I_I excellent—*Abies firma, A. sachalinensis, Chamaecyparis pisifera, Cryptomeria japonica, Populus suaveolens* and *Paulownia tomentosa*; (4) I_C and I_I medium—*Pinus pentaphylla, Tsuga sieboldii, Picea jezoensis, Acer mono, Distylium racemosum*, and *Ulmus davidiana* var. *japonica*; (5) I_C medium, I_I bad—*Cyclobalanopsis acuta*. Results of measurements of dimensions of tracheids, fibres, vessels and rays are also tabulated. The relationships σ_C and σ_S to cell-wall thickness (T_C) are shown in graphs and expressed by the formula $\sigma_C = 151{\cdot}9\ T_C$ and $\sigma_S = 38{\cdot}4\,T_C$. The anisotropic properties of *Fagus crenata* were also tested on specimens with grain angles of 0°, 15°, 30°, 45°, 60°, 75° and 90°. Test results showing the effect of grain angle on σ_C, σ_B, σ_T, σ_I and σ_S are given in graphs and tables. There is a 12-page English summary; graphs and tables have English legends.

4064. Mamada, S. **[Wood study on *Juniperus virginiana* L. and *J. chinensis* L.]** *Bull. Tokyo Univ. For.* No. 46, 1954 (225–31). 6 refs. [Jap.e.]

Results of strength tests and a comparison with American results for *J. virginiana* are given in tables [with English legends]. *From author's summary.*

4065. Pallay, N., Bulin, I., and Kiss, J. A köszegi, csepregi és szentgotthárdi vörösfenyök szilárdsági vizsgálata. II közlemény. **[Strength tests on Larch from Köszeg, Csepreg, and St. Gotthard. Part 2.]** *Erdömérnöki Föiskola Évkönyve Sopron 1951/52, Budapest,* 1953 (121–60). [Hung. russ.g.]

Tabulates and graphs the following properties: compression ||, tension ||, bending strength (air-dry), modulus of flexibility and elasticity, impact strength, shear ||, hardness, density (air-dry), shrinkage (linear and volume), for stems of 68–95 years, d.b.h. 28–35 cm., height 20–30 m.

4066. Stegaru, M., and Leandru, L. Contribuţii la cunoaşterea insuşirilor technologice ale lemnului de *Quercus borealis*. **[Physical and mechanical properties of the wood of *Q. borealis*.]** *Rev. Pădurilor* 68 (5), 1953 (33–5). 3 refs. [Rum. rum.russ.]

Gives Rumanian data for sp. gr., resistance to compression and tension ∥, static bending, and shear (radial and tangential), and hardness ∥ and ⊥.

4067. Radcliffe, B. M. **Proposed new methods for determination of the stiffness of timber beams and the strength of wood columns.** *Sta. Bull. Ind. agric. Exp. Sta.* No. 596, 1953. pp. 21. 11 refs.

It was found for 5 important species that the apparent moduli from ASTM tests were lower than the true moduli from compression tests by an amount proportional to the shear deflection. It was also determined that the equation for long columns is conservative even when the true modulus of elasticity (E)—rather than the apparent—is used. On the strength of the experimental evidence, the following recommendations are made: (1) That existing design values of modulus of elasticity be increased from 8 to 12% according to species. (2) That all future values for E be determined from tests of compression ∥. (3) That shear deflections be included in the computation of total deflection. (4) That E should be used in the calculations of beam deflections, and, when the modulus of rigidity is not known, a modulus of rigidity equal to $\frac{1}{16}$th of E should be used to compute the shear deflection component. (5) E should be applied to column design. (6) The relatively few long column tests indicate that there need be no reduction factor applied to Euler's equation as is currently done. *From author's summary.*

4068. Ivanov, Ju. M. Približennoe grafičeskoe nahoždenie granicy dvuh oblasteĭ deformirovanija na mašinnoĭ diagramme. **[Approximate graphical determination of the boundary between two deformation regions in the [testing] machine diagram.]** *Trud. Inst. Les.* 9, 1953 (332–6). 1 ref. [Russ.]

Illustrated description of two simple graphical methods of determining the limit of plastic flow without drawing the graph of the differential quotient of the machine diagram.

4069. Baženov, V. A. Dinamičeskiĭ modulj uprugosti drevesiny kak pokazatelj ee fiziko-mehaničeskih svoĭstv. **[Dynamic modulus of elasticity of wood as an index of its physical and mechanical properties.]** *Trud. Inst. Les.* 9, 1953 (383–97). 8 refs. [Russ.russ.]

The author found practically no difference between the dynamic and static modulus of elasticity (m.e.) for wood specimens where $l/h \geqslant 25$ (l = free length, h = height of the specimen). The dynamic m.e. depends largely on the moisture content and, to a lesser degree, on temperature (in the range 20–100° C.). There exists a correlation between the dynamic m.e., and the sp. gr., and static and impact bending strength of wood.

4070. Sadovskiĭ, F. F. K metodike opredelenija dinamičeskogo modulja uprugosti drevesiny. **[Method of determining the dynamic modulus of elasticity of wood.]** *Trud. Inst. Les.* 9, 1953 (398–401). [Russ.]

Describes a modification of the method described in a previous paper [cf. *For. Abstr.* 15 (No. 673)].

4071. Suzuki, Y. **Creep of a wood beam in a moisture transitional state.** *Trans. 61st Mtg. Jap. For. Soc.* 1952 (210–1). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo No. 3, 1952/53* 1954 (90). [E.]

Creep of wood in a transitional state, e.g. during absorption or desorption, was found to be much higher than that of wood in moisture equilibrium.

4072. Ivanov, Ju. M. K voprosu issledovanija skladki razrušenija drevesiny pri sžatii vdolj volokon. **[Investigation of the buckling accompanying the failure of wood when compressed parallel to the grain.]** *Trud. Inst. Les.* 9, 1953 (115–20). 4 refs. [Russ.]

Discusses the causes of tangential shear during the failure of test pieces shaped to rectangular prisms, the lateral faces of which are parallel alternately to the tangential and radial plane. The rays are not the only group of anatomical elements responsible for the tangential direction of shear during compression failure of wood; this direction is probably also due to the resistance of the tangential cell wall to rupture across the grain. The oblique arrangement of buckling on tangential faces has been explained as due to the oblique arrangement of the rays containing resin ducts but is more probably determined by the planes of the maximum shear deformation. The breakdown appears to be secondary, i.e. determined by strain rather than by stress.

4073. Baženov, V. A., Perelygin, L. M., and Semenova, E. A. Ob ispytanii drevesiny na sžatie poperek volokon. **[Investigation of the compression strength of wood across the grain.]** *Trud. Inst. Les.* 9, 1953 (315–31). 7 refs. [Russ.russ.]

Presents graphed results of measurements of deformation during compression ⊥ (load applied to the whole area of the test piece) of conifer wood (Pine, Spruce), ring-porous species (Oak, Ash sapwood, Elm), soft diffuse-porous (Aspen, Birch), and hard diffuse-porous species (Beech, Hornbeam), in radial and tangential directions and for moisture contents 10%, 20%, and > 100%. Results obtained by means of two Russian machines are compared. The relationships between the limit of plastic flow (l.p.f.), in compression ⊥, and the density, and (for Pine) between l.p.f. and the distance from the pith, are graphed. The authors conclude that the compression strength (⊥ grain) has no characteristic relationship with either the density of wood or its load at failure. The standard Russian method (OST–250 NKLes) of testing wood for compression ⊥ is, in reality, only a method for testing the 'squeezing' of wood (the whole area of the test piece not being compressed), and should be supplemented by an additional test involving compression of the whole piece.

4074. Ivanov, Ju. M. Soprotivlenie drevesiny sosny sžatiju pod raznymi uglami k voloknam. **[Compression strength of Pine wood at different**

angles to the grain.] *Trud. Inst. Les.* 9, 1953 (347–70). 12 refs. [Russ.]

Presents the results of tests on the limit of proportionality and limit of plastic flow (l.p.f.) for air-dry *Pinus sylvestris* test pieces (30 × 45 mm.) having 30 × 30 mm. compressed at different angles (α) to the fibres. The best empirical relationship between the stress at the l.p.f. ($\sigma_{p.f.}$) and the angle was found to be:

$$\sigma_{p.f.}\alpha = \frac{\sigma_{p.f.}\,0^\circ}{1 + \left[\dfrac{\sigma_{p.f.}\,0^\circ}{\sigma_{p.f.}\,90^\circ} - 1\right]\sin^2\alpha}$$

4075. Huhrjanskiĭ, P. N. Relaksacija i posledeĭstvie estestvennoĭ i pressovannoĭ drevesiny pri sžatii. **[Relaxation and 'after-effect' [dimensional recovery time] of natural and compressed wood during compression.]** *Trud. Inst. Les.* 9, 1953 (337–46). 3 refs. [Russ.russ.]

It has been found that compression || and ⊥ near the value of the limit of plastic flow (l.p.f.) causes deep changes in the fine structure of wood. When the stress increases beyond l.p.f., the cell walls of the single cells or groups of cells lose their stability, undergoing either crushing or shear. The ever-increasing deformations, which confirm the internal changes, are best displayed on graphs of reduced stress (in terms of l.p.f.) against the (relative) increase of deformation (a function of the first differential quotient of the deformation/stress curve). The l.p.f. determined from the variation of the deformation increase during the 'after-effect' test agrees well with that obtained by Ivanov's method [cf. *For. Abstr.* 15 (No. 2845)].

4076. Sawada, M. **[Method of testing tension perpendicular to the grain.]** *J. Jap. For. Soc.* 35 (8), 1953 (254–7). 6 refs. [Jap.e.]

In a new method the Amsler testing machine was used for hardwoods and a single-lever-type machine for softwoods. The test piece [dimensions and shape are illustrated] was held in a wedge grip [illustrated] and its elongation determined by a mirror extensometer. Results are shown in graphs in which increase of length (Δl) of a length l_0 is used as abscissa ($\Sigma = \Delta l/l_0$) and the tensile strength (σ kg./sq. cm.) as ordinate, and are tabulated. The nature and place of the fractures are shown in photographs. The tensile strengths found by this method appear to be higher than results from U.S.A., Germany and other workers in Japan. [Tables and illustrations have English legends.] *From author's summary.*

4077. Perelygin, L. M., and Orlova, E. K. Soprotivlenie drevesiny vdavlivaniju i vydergivaniju gvozdeĭ. **[Driving and withdrawal resistance of nails.]** *Trud. Inst. Les.* 9, 1953 (371–8). [Russ.russ.]

Tests on Pine wood in radial and tangential directions failed to disclose any marked difference between the energy required for the driving and the withdrawal of nails. When driving nails into green Hornbeam wood, however, a greater effort was found to be necessary in the tangential than in the radial direction. High moisture content diminishes the effort required, particularly for driving. Both driving and withdrawal require ca. 4 times as much effort with Hornbeam as with Pine.

4078. Perelygin, L. M., and Krjažev, N. A. O vlijanii vysyhanija drevesiny na sposobnostj uderživatj gvozdi. **[Effect of the drying of wood on its nail-holding power.]** *Trud. Inst. Les.* 9, 1953 (379–82). 1 ref. [Russ.russ.]

The nail-holding power of Scots Pine into which nails were driven while the wood was green falls steeply to 0·4–0·33 of the original value when the wood dries out.

4079. Siimes, F. E., Johanson, P. E., and Niskanen, E. Naulaliitostutkimuksia III. Mäntypuun eri ominaisuuksien ja laadun vaikutus reunapuristusja tartuntalujuuteen. **[Investigations on nailed joints III. The ultimate embedding strength and nail-holding power of Finnish Pine (*Pinus sylvestris*).]** *Tied. Valt. tekn. Tutkimusl.* No. 122, 1954. pp. 71. 29 refs. [Fi.e.]

812.8. Workability. Working Properties

4080. Compte rendu des recherches sur peupliers '*robusta*'. **[Research on the working qualities of *Populus robusta* wood.]** *For. France* No. 52, 1954 (11). [F.] X.

Tests carried out at the Centre Technique du Bois on wood 22 to 32 years old indicates that veneer can be cut from logs of 35–40 cm., but not satisfactorily from smaller ones. The arrangement of branches makes it possible to cut short logs clear of all knots. The wood nails well and is suited for box manufacture. Owing to the short life of this Poplar, however, it is difficult to obtain large, sound logs, and pulpwood is probably its best use. [Cf. *For. Abstr.* 15 (No. 4031).]

813. *Wood Chemistry*

See also Nos. 3982, 4309 *et seq.*

4081. Jahn, E. C., Holmberg, C. V., and Schuerch, C. **The chemical structure of wood.** *Chemistry in Canada, Ottawa* 5 (4), 1953 (35–42). 82 refs. L.S.

A review of the whole field. Details on the whole wood, cellulose, hemicelluloses, and lignin are given.

4082. Savard, J., Besson, A., and Morize, S. Analyse chimique des bois tropicaux. **[Chemical analysis of tropical woods.]** *Publ. Centre tech. for. trop.* No. 5, 1954. pp. 191. 110 refs. [F.]

The first 120 pages consist of a detailed account, with illustrative examples, of various methods of chemical analysis: the preparation of samples; influence of duration of storage; alcohol, hot-water, and NaOH extraction; determination of mineral substances, tannins, mannans, galactans, furfural, cellulose, lignin, starch, and methoxyl and acetyl indices. This is followed by the following tabulated data (arranged alphabetically under native names of species): (1) the results of some 400 partial analyses of 250 tropical species (hot-water extractives, alcohol extractives, NaOH extractives, ash, total furfural, total pentosans, total cellulose, corrected cellulose (= total cellulose less calculated amount of pentosans), lignin, reducing agents, and partial balance); (2) results of total analysis of 39 species; (3) mannans and galactans for 43 species; (4) methoxyl and acetyl indices for 36 species; (5) SiO_2 content of 180 species (220 analyses). There are several indexes: (*a*) botanical names, arranged under families, (*b*) botanical names, arranged alphabetically, (*c*) native names, arranged geographically.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also Nos. 4004, 4265.

4083. Horioka, K., Horiike, K., and Kato, S. **[Research on improving wood. 2nd report. Study on the electrokinetic potential in relation to improving wood.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (67–93). 25 refs. [Jap.jap.e.]

The zeugma potential of *Chamaecyparis obtusa*, *Pinus densiflora*, *Betula maximowicaiana*, *Fagus crenata*, *Tilia japonica* and *Shorea* spp. and of some adhesives was found by electrophoresis. The zeugma potential of wood was below that of standard cellulose but above that of oxycellulose. The value of the zeugma potential of wood (untreated, kiln-dried or soaked for 24 hr. in 1% NaOH solution) decreased with the length of immersion, and most rapidly during the first 6 hr. A formula for this reaction is presented and discussed in relation to water absorption by wood. Measurements on the relation between the zeugma potential of *F. crenata* and *P. densiflora* and of adhesives and the pH value showed that the variation in zeugma potential of the woods was nearer to that of oxycellulose than of standard cellulose. [Results are given in tables and graphs with English legends.] *From authors' summary.*

4084. Jayme, G. **On the significance of tension wood in Poplars.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* [*n.d.*] pp. 6. 8 refs. Transl. from *Holz Roh- u. Werkstoff* 9 (5), 1951 (173–5). [See *For. Abstr.* 13 (No. 1526).] Limited distribution. P.R.

4085. Leopold, B. **Recent lignin research in Sweden.** *Pulp Paper Mag. Can.* 55 (3), 1954 (184–6). 2 refs.

4086. Tschamler, H., Kratzl, K., Leutner, R., Steininger, A., and Kisser, J. Die Ultrarotspektren mikroskopischer Holzschnitte und einiger Modellsubstanzen. **[The infra-red spectra of microscopic wood sections and of some model substances.]** *Repr.* from *Mikroskopie, Wien* 8 (7/8), 1953 (238–46). 15 refs. [G.g.e.] X.

It is shown that, by using sufficiently thin microscopic wood sections, it is possible to obtain spectra from which an evaluation can be made. The spectra are a combination of carbohydrate and lignin which cannot be explained in detail, but the native lignin certainly contains a considerable amount of aromatic nuclei.

4087. Konkin, A. A., and Rogovin, Z. A. Delignifikacija drevesiny ètilenglikolem. **[Delignification of wood by means of ethylene glycol.]** *Bumažnaja Promyšlennostj, Moskva* 28 (9), 1953 (15–9). 7 refs. [Russ.] L.S.

Results of the authors' research show that the glycol-extracted lignin contains 8·8–13·7% of OH groups, compared with 8·23% for the hydrolysis-process lignin. The OH-group content falls and the proportion of insoluble lignin increases as the proportion of the catalyst used (mainly HCl) increases. The methoxyl-group content is not greatly affected by the conditions of extraction with glycol; it varies, however, considerably with the degree and method of purification of the glycol-lignin.

4088. Odincov, P. N., and Kreĭcberg, Z. N. Okislenie vydelennyh ligninov i lignina v drevesine. **[Oxidation of the isolated lignins and of lignin in wood.]** *Trud. Inst. lesohoz. Probl.* No. 6, 1953 (63–76). 42 refs. [Russ.russ.]

Oxidation (with $C_6H_5NO_2$ in alkaline medium) of Spruce sawdust, cuprammonium lignin, alkali lignin, and H_2SO_4 (Clason) lignin gave 21·78, 17·23, 13·87, and 1·5% of vanillin (in terms of lignin), respectively. Short-duration soft prehydrolysis (2% H_2SO_4) does not decrease the vanillin yield, but longer prehydrolysis (3 or 6 hours) does so.

4089. Bland, D. E., and Gatley, F. M. **Subproject C.6–2.—Chemical reactions, molecular weight and constitution of Eucalypt lignin. Progress report No. 14. Further experiments on the resolution of methanol extracts of *E. regnans* wood.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 12 + 6 gphs. P.R.

4090. Aaltio, E., and Roschier, R. H. Ligniinin kemiallinen sitoutuminen haapapuussa puskuroitujen butanoli-vesikeittojen valossa. **[The chemical combination of lignin in Aspen wood with reference to buffered butanol/water cooks.]** *Pap. ja Puu* 36 (4*a*), 1954 (157–74). 41 refs. [Fi.e.] P.R.

During 9 successive cooks of *Populus tremula* using a neutral buffered mixture of butanol and water at 158° C., 62·5% of the wood and 92·6% of the lignin were dissolved. On the basis of analyses carried out, it was observed that the quantitative proportion of the amounts of lignin and pentosans (L/P ratio) dissolved was a constant. In cooks 2–5 the ratio was about 0·85 and in 7–9 about 0·64. With the change in L/P ratio there was also a considerable change in the methoxyl content in the lignin, which decreased from 20–21 to about 15%; there was also a distinct defibration of the wood substance showing that the compound middle lamellae are dissolved by this stage. The complex compound with the L/P ratio 0·85 thus belongs to the middle lamellae which are dissolved in the first cooks, and that with the ratio 0·64 is a constituent of the secondary lamellae. During the first cook, L/P ratio 1·35, proportionally more lignin is dissolved than pentosan. This may be explained by the assumption that a part of the lignin is 'free' or not bound in the middle lamellae. The dissolving mechanism of the lignin-pentosan compounds is discussed. [Results of the experiments are given in tables and graphs with English legends.] *From authors' summary.*

4091. Kawamura, I., and Higuchi, T. **[Relations between lignin and carbohydrates in wood. IX. Lignin residue in chlorite pulp].** *Journal of the*

Society of Textile and Cellulose Industry, Tokyo 9 (4), 1953 (157–9). 7 refs. [Jap.e.] L.S.

Beech wood meal was treated 1–10 times with acidified chlorite (Barton's method), and both the pulps obtained and lignin regenerated from the waste liquor were analysed. The pulps were acetylated, and ligneous substances extracted from each pulp with $CHCl_3$ and acetone successively. The ligneous substances were saponified with dilute NaOH, dissolved in dioxane and developed by paper chromatography. Lignin, but no carbohydrates, was found on the upper part of the paper. The lignins were extracted, hydrolysed with dilute H_2SO_4 and again developed. Xylose was found in these solutions. The authors conclude that the ligneous substances contain xylose combined chemically with lignin.

4092. Ishikawa, H. **[Studies on lignin (VI). The phenolization of lignin.]** *J. Jap. For. Soc.* 35 (1), 1953 (22–7). 20 refs. [Jap.e.]

Cf. *For. Abstr.* 14 (No. 3749).

4093. Ishikawa, H. **[Studies on lignin (XI). The distribution of molecular weights of lignin [isolated by different methods].]** *J. Jap. For. Soc.* 35 (12), 1953 (396–405). 11 refs. [Jap.e.]

Results, from lignins isolated from *Cryptomeria* wood, are shown in graphs and tables with English legends.

4094. Higuchi, T., Kawamura, I., Morimoto, I., and Kanda, T. **[The formation of lignin in Bamboo [*Phyllostachys* spp.] shoots. (II) The relation between an increase in the methoxyl content of the lignin and a change in the ratio of building units.]** *J. Jap. For. Soc.* 36 (4), 1954 (101–6). 17 refs. [Jap.jap.e.]

Graphs and tables have English legends.

4095. Stewart, C. M., and Foster, D. H. **Project C5.—Carbohydrates of wood. Sub-project C.5–6—Constituent units of the total carbohydrate fraction. Progress report No. 4. A preliminary study of the non-resistant carbohydrate components of the wood of *Eucalyptus regnans* F.v.M.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 21. 34 refs. P.R.

813.2. Minor Organic Constituents. Extractives. Cell Contents.

See also Nos. 4053, 4329.

4096. Gripenberg, J. **The constituents of the heartwood of the genus *Thuja* and some related genera.** *J. sci. industr. Res., India* 12*A* (5), 1953 (233–7). 22 refs. D.S.I.R.

A review giving information on the constituents of *Thuja plicata*, *T. occidentalis*, *Chamaecyparis obtusa*, *C. nootkatensis* and *Thujopsis dolabrata*.

4097. Roff, J. W., and Atkinson, J. M. **Toxicity tests of a water-soluble phenolic fraction (thujaplicin-free) of Western Red Cedar.** *Canad. J. Bot.* 32 (1), 1954 (308–9). 3 refs. O.R.S.

The extract at concentrations of 2·0, 4·0 and 8·0% completely inhibited the growth of *Poria monticola* in culture, while at concentrations of 0·5 and 1·0% growth continued. Fungus growth was resumed, however, when the inocula were transplanted, indicating that the extract is fungistatic rather than fungicidal. It can be concluded that the thujaplicins are not solely responsible for the toxicity of the aqueous extracts, nor for the durable character of the heartwood.

4098. Duff, S. R., and Erdtman, H. **The chemistry of the natural order of Cupressales. X. Nootkatin.** *Chem. & Ind.* 1954 (15), (432–3). 3 refs. P.R.

Presents chemical proof for the structure deduced from X-ray evidence for the tropolone nootkatin, $C_{15}H_{20}O_{21}$ from the heartwood of *Chamaecyparis nootkatensis*. [Cf. *For. Abstr.* 14 (No. 1533).]

4099. Kondo, T., and Furuzawa, N. **[Chemical studies on *Larix kaempferi* [*L. leptolepis*] (I) The extractives (1). (II) The extractives (2): examination of the heartwood phenols by quantitative methods.]** *J. Jap. For. Soc.* 35 (12), 1953 (406–9), 16 refs.; 36 (1), 1954 (19–22), 6 refs. [Jap.e.]

(I) Results of paper-chromatographic studies showed that a very small amount of katuranin was present with distylin in the heartwood. Two semi-quantitative paper-chromatographic methods were elaborated to determine the most probable content of distylin present.

(II) Determination of distylin by colorimetric and spectro-photometric methods showed that the most probable figure for content of this phenol was 4%, based on the dried wood flour. Paper partition chromatography gave more reproducible results. *From authors' summaries.*

4100. Hata, K., and Sogo, M. **[Detection of the phenolic substances of *Pinus densiflora, P. thunbergii, P. pentaphylla* var. *himekomatsu* and *P. armandi*.]** *J. Jap. For. Soc.* 36 (1), 1954 (8–11). 5 refs. [Jap.e.]

[Cf. *For. Abstr.* 14 (Nos. 1534–6).] The phenolic substances were determined by paper chromatography. The heartwood of *P. densiflora* and *P. thunbergii* contained pinosylvin monomethyl ether, pinocembrin, pinobanksin and an unidentified substance, and occasionally dihydropinosylvin monomethyl ether and an unidentified substance. Those of *P. pentaphylla* var. *himekomatsu* and *P. armandii* contained dihydropinosylvin monomethyl ether, chrysin, strobobanksin, strobopinin, cryptostrobin, two unidentified substances, pinosylvin, pinosylvin monomethyl ether, pinocembrin and pinobanksin; pinostrobin was found in the heartwood of *P. pentaphylla* var. *himekomatsu*. The sapwood of all species contained small amounts of the heartwood phenols. Tests with benzidine reagents showed that the bark of all species probably contained a large amount of phenolic substances but only small quantities of some of the known Pine phenols. *From authors' summary.*

4101. Sogo, M., and Hata, K. **[Detection of the constituents of Himekomatsu (*Pinus pentaphylla* var. *himekomatsu*) by paper partition chromatography.]** *Tech. Bull. Kagawa-Ken agric. Coll.* 5 (1), 1953 (15–8). 5 refs. [Jap.e.] A.P.B.

The heartwood was found to contain considerable amounts of pinosylvin monomethyl ether, pinocembrin, pinobanksin, and pinostrobin and small amounts of pinosylvin dihydropinosylvin monomethyl ether, chrysin, strobobanksin, strobopinin and cryptostrobin, while the sapwood contained only a small amount of pinosylvin monomethyl ether and traces of pinosylvin and pinobanksin. Most phenols in the heartwood were also found in the bast (mixed with cambium) but in small quantities. The cork contained only pinobanksin of the heartwood phenols but was rich in other unknown phenols. In all samples two unknown substances were found, as also *l*-arabinose and *d*-glucose in the water-soluble fraction of the acetone extract. The bast was the richest in sugars. *From authors' summary.*

4102. Kajanne, P. **Investigations on the fatty acids of Pine wood and tall oil particularly considering the isomerizing effect of saponification methods, autoxidation and the sulfate cooking process.** *Annales Academiae Scientiarum Fennicae, Helsinki* (*Ser. AII*) No. 50, 1953. pp. 82. 208 refs. [E.e.] L.S.

An abbreviated version in Finnish with English summary appears in *Pap. ja Puu* 36 (1), 1954 (1–10).

4103. Black, R. A., Rosen, A. A., and Adams, S. L. **The chromatographic separation of hardwood extractives giving color reactions with phloroglucinol.** *J. Amer. chem. Soc.* 75 (21), 1953 (5344–6). 16 refs. O.R.S.

Four aromatic aldehydes giving phloroglucinol colour reactions were isolated by paper chromatography from ethanol extracts of White Oak. They were identified as syringaldehyde, vanillin, coniferaldehyde and sinapaldehyde and the last 2 were established as the components giving lignin-like coloration with phloroglucinol. Of 8 hardwoods and 4 softwoods examined, all but *Prunus serotina* and *Sequoia* sp. contained coniferaldehyde, and all the hardwoods except *P. serotina* contained sinapaldehyde.

4104. Perilä, O. Koivun (*Betula verrucosa*) runkosolukon hartsi-, rasva- ja vahamaisten aineiden sijanti. **[The location of the resins, fats and waxes in the stem cells of Birch.]** *Pap. ja Puu* 36 (4), 1954 (213–6). 5 refs. [Fi.e.] P.R.

Photomicrographs [with English legends] are given, showing the position in the cells of (1) the resins, fats and waxes as a group, stained with Sudan III; (2) the acidic resins, fats and waxes and the proteins stained with oxazine, the reduced form of Nile blue; and (3) the neutral resins, fats and waxes stained with oxazone, the oxidized form of Nile blue. The extractives as a group appear in medullary rays, the walls and partition walls of the vessels, the middle lamellae of libriform cells and the medullary spots; the acidic extractives mainly in the middle lamellae of all cells and sometimes on the inner cell wall; and the neutral extractives mainly on the inner walls of the ray cells and in the partition walls of the vessels. *From author's summary.*

4105. King, F. E., King, T. J., and Manning, L. C. **The chemistry of extractives from hardwoods. Part XIV. The constitution of jacareubin, a pyranoxanthone from *Calophyllum brasiliense*.** *J. chem. Soc.* Dec., 1953 (3932–7). O.R.S.

4106. King, F. E., and King, T. J. **The chemistry of extractives from hardwoods. Part XV. The constitution of methyl vinhaticoate [from the heartwood of *Plathymenia reticulata*].** *J. chem. Soc.* Dec., 1953 (4158–68). O.R.S.

Cf. *For. Abstr.* 14 (No. 3766).

4107. King, F. E., and Bottomley, W. **The isolation from *Acacia melanoxylon* of a flavan–3:4-diol and its possible bearing on the constitution of phlobatannins.** *Chem. & Ind.* 1953 (51), (1368). 6 refs. P.R.

4108. Laidlaw, R. A. **Wood saponins. Part I. A preliminary investigation of the saponins from Morabukea [*Mora gonggrijpii* (Kleinh.) Sandwith].** *J. chem. Soc.* Feb., 1954 (752–7). [Forest Products Research Laboratory, Princes Risborough.] O.R.S.

4109. Sawhney, P. L., and Seshadri, T. R. **Special chemical components of commercial woods and related plant materials: part I—The neutral components from heartwoods and sapwoods of *Pterocarpus dalbergioides* (Andaman Padauk) and *Pterocarpus macrocarpus* (Burma Padauk).** *J. sci. industr. Res., India* 13*B* (1), 1954 (5–8). 23 refs. D.S.I.R.

The heartwood of *P. dalbergioides* was found to contain much pterocarpin, that of *P. macrocarpus* pterocarpin and homopterocarpin in almost equal amounts. Sapwoods of both species yield only homopterocarpin.

4110. Pacheco, H., and Mentzer, C. Sur la nature du triterpène isolé du bois de platane (*Platanus vulgaris*). **[The triterpene isolated from wood of *P. orientalis*.]** *C.R. Acad. Sci., Paris* 238 (10), 1954 (1160–2). 7 refs. [F.f.] O.R.S.

The crystalline substance isolated from the heartwood proved to be betulinic acid already isolated from the bark of *P. acerifolia*. [Cf. *For. Abstr.* 11 (No. 63).]

4111. Wienhaus, H. Extraktstoffe aus Aspenholz von *Populus tremula*. **[Extractives from the wood of *P. tremula*.]** *Chemische Technik, Berlin* 5 (1), 1953 (24). [G.] L.S.

Analysis of the C_6H_6 and CH_3OH extracts of Aspen sawdust showed that the wood contains a fatty oil resembling linseed oil, and extractives similar to tannins and phlobaphenes and containing free and combined sugars.

813.4. Chemical Effects of Heat. Chemistry of Thermal Decomposition

4112. Runkel, R. O. H., and Witt, H. Zur Kenntnis des thermoplastischen Verhaltens von Holz. III. Mitteilung: Über die wasser- und alkohollöslichen Anteile in hitzeplastiziertem Holz. Ergebnis einer papierchromatographischen Untersuchung. **[The thermoplastic behaviour of wood. 3rd part. The water- and alcohol-soluble constituents in the heat-plasticized wood. Result of a paper-chromatographic investigation.]** *Holz Roh- u. Werkstoff* 11 (12), 1953 (457–61). 9 refs. [G.g.] P.R.

A report of further investigations [cf. *For. Abstr.* 13 (No. 3324)] with results presented in graphs.

Five preparations of treated Beech wood (with lignin content ranging from 3·7 to 33·6%, and furfural content from 21·1 to 4·5%, respectively) were subjected to hot pressing; the water- and alcohol-soluble constituents of the compressed products were analysed by paper chromatography. It was found that, for the product with only 3·7% lignin, the hot pressing causes deep changes in hemicelluloses, particularly in pentosans; besides higher bending-strength figures, the products disclose higher swelling figures. The prehydrolysed products (poor in hemicellulose) show a smaller bending strength and a greater water-repellency. Paper chromatography disclosed, in hot-water and ethanol extracts, glucose, xylose, also probably phenolic substances and, for pressing temperatures above 170–180° C., uronic acids as well.

4113. Sergeeva, V. N., Pavare, B. G., and Domburg, G. E. Termičeskoe razloženie ksilana v toke vodoroda. **[Thermal decomposition of xylan in a hydrogen stream.]** *Trud. Inst. lesohoz. Probl.* No. 6, 1953 (38–50). 9 refs. [Russ.russ.]

It was found that xylan was responsible for up to 70% of residual tar, up to 5% of soluble tar, and ca. 30% of volatile acids formed during thermal decomposition of Birch wood in H_2. Pentosans play an important part in the formation of aromatic compounds during wood pyrolysis.

813.5. Reaction with Metals

4114. Krause, R. L. **Iron stain from metal fastenings may accelerate decay in some woods.** *J. For. Prod. Res. Soc.* 4 (2), 1954 (103–11). 25 refs.

Tests made on iron-stained and control blocks of *Swietenia* sp., *Quercus alba*, *Liriodendron tulipifera*, *Sequoia sempervirens* and *Picea sitchensis*, using *Lenzites trabea* and *Poria incrassata* as test fungi, showed that decay was increased by the presence of iron staining in the 3 hardwood species. In further tests on White Oak and 'Mahoganies' (*Swietenia* sp., *Shorea* sp., and *Khaya* sp.) common wire nails, cement-coated nails and etched nails in the test blocks all increased the amount of decay over that in controls, but there was some evidence that the presence of galvanized nails reduced decay below that in unnailed controls. Hot-water extractives of *Swietenia* sp. with iron added proved markedly less toxic to the 2 fungi than extractives with no iron. Reaction with iron did not appear to affect the moisture-absorbing or -holding characteristics of the iron-stained wood. The use of non-ferrous fastenings may be desirable for hardwoods in positions where moisture content will be above 20% for long periods.

813.8. Poisonous and Irritant Properties

See No. 3601.

814. *Natural Durability. Old Wood. Fossilized Wood*

See also Nos. 3289–90, 4097, 4248, 4264.

4115. Kohara, J. **[Studies on the durability of wood. III. Mechanical properties of old timbers. (*Zelkova serrata* 310–530 years old).]** *Scientific Reports, Saikyo University, Kyoto: Agriculture* No. 4, 1953 (98–109). 13 refs. [Jap.e.] P.R.

All mechanical properties and sp. gr. of old *Z. serrata* timber were found to be inferior to new timbers. Little further deterioration occurs between 310 and 530 years old.

4116. Zalewska, Z. Trzeciorzędowe szczątki drewna z Turowa nad Nysą Eużycką. **[Tertiary wood remains from Turów on the [Western] Neisse.]** *Extr.* from *Acta Geologica Polonica, Warsaw* 3, 1953 (481–543 + pp. 12 + 38 photos + 3 tbls). 50 refs. [Pol.pol.russ.e.] X.

Describes fossil remains of the wood of 14 coniferous species found in brown coal strata. Two new species belong to the genus *Podocarpoxylon*. A table shows the vertical distribution of ca. 230 samples, and the approximate boundary line between two development stages of conifers as determined from the systematic composition of the samples examined.

4117. Bruun, T. **Hydrogen disproportionation in fossil stumps of Scots Fir (*Pinus sylvestris* L.).** *Skrifter, Kongelige Norske Videnskabers Selskab, Trondheim* 1950 (4). pp. 85. 127 refs. [E.e.] L.S.

Presents results of an investigation on the terpenes in a *P. sylvestris* believed to be 5000–6000 years old. Owing to long contact with peat, considerable changes e.g. in the proportion of H have taken place.

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

See also No. 4202.

4118. **New woodworking machinery.** *Wood* 19 (3), 1954 (144–5).

Describes briefly, with some illustrations, woodworking machinery including sanders, veneering equipment and a heating mat used in moulding, exhibited by three firms at the British Furniture Exhibition.

4119. **New woodworking machines.** *Cabinet Mkr.* 1954 (2845), (437 . . . 441). P.R.

Illustrated descriptions of new machines made by 9 British manufacturing firms, viz. spray gun, lathe, electric saw, drilling attachment, double cross-cut saw, saw chain, guillotine, sander, and mortising machine.

821. *Barking*

See also No. 3629.

4120. **Pneumatic debarker.** *Paper Tr. J.* 136 (4), 1953 (34).

Describes the Andersson barker: (*a*) stationary or semi-portable model and (*b*) portable model, each in 3 sizes. [Cf. *For. Abstr.* 14 (No. 2663).]

4121. **Can mechanical barking aid in northern hardwood utilization?** *Paper Tr. J.* 138 (20), 1954 (104–5). P.R.

Presents operating details and a performance report of a pneumatic Andersson barker used for the barking of log-length hardwood (Birch, Beech, Maple, and Oak) in a Massachusetts mill.

822. *Saws and Sawing*

4122. Foyster, J. R. **Modern mechanical saw practice.** Crosby Lockwood & Son Ltd., 39 Thurloe Street, London, S.W.7. 2nd ed., 1953. pp. + 238. Price 18*s.*

[Cf. *For. Abstr.* 9 (No. 2388).] This edition contains an additional chapter on new types of saws and equipment, including: the triple 'S' sawblade in diameters ranging from 12 to 18 in. and with only 8, 12 or 16 cutting points; the hard-tip disposable blade which needs no sharpening, grinding or gulleting, and is discarded as soon as the cutting points become blunted; the squared-circle sawblade, consisting of a square saw plate with a series of scientifically designed teeth in each corner; tungsten-carbide-tipped saws, their manufacture, use and maintenance; the Jayko saw which has tungsten-carbide tips and is specially designed to saw blockboards, laminated boards, difficult hardwoods and veneered panels; and the Electro Tempo automatic feed attachment.

4123. Holland, S. **Principles of machine work.** *Timb. Tr. J.* 208 (4035–6), 1954 (294–5; 470–2).

Discusses breakdown of the log, resawing, hook angle for swage and spring setting (with results of some experiments), and factors determining the quality of the surface in rotary planing.

4124. Thunell, B. **Technical sawmill research in Sweden.** *Transl. For. Prod. Lab., Can.* No. 58, 1953. pp. 5. Transl. from *Medd. svenska Träforskn-Inst.* (*Trätekn. Avd.*) No. 31*B*, 1952. [Cf. *For. Abstr.* 13 (No. 4239).] Limited distribution. P.R.

4125. Hartman, L. A. Los aserraderos escandinavos mas indicados para la aserradura de rollizos delgados y medianos de coníferas. [**Scandinavian saws most suitable for the conversion of small or medium-sized softwood logs.**] In *Bosques y Maderas* [special issue of *Chile maderero*]. 1954 (25–7). [Span.]

4126. **Proposed Norwegian standard for saw blades for wood manufacturing. Information Bulletin from Norway's Standardization Association No. 245.** *Transl. For. Prod. Lab. Can.* No. 73, 1954. pp. 8. Transl. from *Norsk Skogind.* 7 (11), 1953 (424–7). [See *For. Abstr.* 15 (No. 2872).] Limited distribution.

4127. Adam, J. Das Gatterlot. [**The plumb-line for frame saws.**] *Holz-Zbl.* 80 (60), 1954 (737–8). [G.]

An illustrated description of the plumb-line used in frame-saw work, and its various applications.

4128. Hrycyk, R. Metody pomiaru zużycia mocy przez rak przy przecieraniu drewna. [**Methods of determining the power consumption of a frame-saw during conversion of wood.**] *Sylwan* 98 (1), 1954 (67–76). [Pol pol.]

Tabulates and discusses the results of measurements of power consumption, using different methods. The most suitable for determining the average consumption consists in measuring the amount of electrical energy consumed by the motor during conversion of a given log section in a given time, the necessary conditions being: uniform feed rate, constant cutting speed, and constant voltage. Direct measurement by means of a wattmeter does not give reliable information on the average consumption, owing to considerable variations in the power consumption during the process of conversion; it does supply, however, the maximum power requirement for a given log section. Both the measurements of the maximum loads, and oscillograms, show that the power of the motor should be so chosen as to enable its maximum moment of rotation to overcome the relatively heavy inertia of the frame-saw and to prevent its stopping at peak loads. For a 3-phase current, the best motor is the slip-ring induction motor with a high-resistance starter.

4129. Harris, P. **Mechanics of sawing: band and circular saws.** *Bull. For. Prod. Res., Lond.* No. 30, 1954. pp. 30. 2 refs. Price 1*s.* 6*d.*

The cutting action of band saw and circular saw teeth is analysed and relationships are established between the dimensions of the wood removed and the conditions of sawing. A theory is formulated on the resistance offered by the wood to the passage of a saw tooth. Equations are derived for the power demand and energy consumption in sawing, in terms of speed, shape, spacing and relative sharpness of the teeth and the strength properties of the wood. The influence of the cutting conditions on the rate of tooth blunting is also studied. *Author's summary.*

4130. Sugihara, H. [**Studies on sawing by band-saw. 1st report. Effects of feed force and kerf width on sawing [time and output].**] *Wood Res., Kyoto* No. 10, 1953 (1–21). 3 refs. [Jap.e.]

4131. Wacker, H. Die Behandlung der breiten Bandsägeblätter. Zweckmässige Zahnform, das Richten und Spannen. [**Handling of wide band-saw blades. Suitable tooth shape, adjusting and tensioning.**] *Holz-Zbl.* 80 (37), 1954 (478 . . . 482). [G.] P.R.

Discusses blade dimensions and strains, instructions for handling the blade, its adjusting and tensioning.

4132. Chardin, A. Peut-on scier tous les bois avec la même denture? [**Can all timbers be sawn with the same pattern of sawtooth?**] *Bois For. Trop.* No. 33, 1954 (41–50). [F.e.span.]

A preliminary report on a study of sawing technique carried out at Nogent-sur-Marne, which shows the importance of classifying logs according to size, hardness etc. and using different blades for different classes of wood and different operations (e.g. primary break-down and re-sawing).

4133. Fukui, H. **On the difference in cutting action between circular rip-saws and cross-cut saws.** *Trans. 61st Mtg. Jap. For. Soc.* 1952 (218–20). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 3, 1952/53 (1954), (86). [E.]

At the higher feed speeds cross-cutting is easier by cross-cut and ripping by rip-saws, but at lower speeds (0–8m./min.), both ripping and cross-cutting are easier by rip-saw.

4134. Saito, Y., and Niga, T. [**The buckling of circular saws (I).**] *Wood Ind., Tokyo* 9 (6), 1954 (277–81). [Jap.e.] P.R.

Measurements were made on temperatures and loads causing buckling in circular sawblades.

823. *Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning*

See also No. 4123.

4135. Haycock, A. H. **Routing.** The Technical Press Ltd., London. 1953. pp. xi + 83 + 25 photos. Price 10*s*. 6*d*.

Describes and illustrates various methods of operating high- and low-speed routing machines with special emphasis on the construction and use of forms.

824. *Forms of Joint. Jointing and Assembly*

824.1. Nailed Joints

See also Nos. 4077–9, 4205–6.

4136. Kuenzi, E. W. **Theoretical design of a nailed or bolted joint under lateral load.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1951, 1953. pp. 25 + 2 dgms. + 5 gphs. 4 refs. P.R.

A theoretical method is derived for determining the allowable lateral load of single-nail and single-bolt joints.

824.2. Screwed Joints

4137. Graf, F., and Toepel, T. (to Badische Anilin- und Soda-Fabrik. **Securing mechanically stressed constructional members to wooden supports.** *U.S. Patent* No. 2,663,662, Dec. 22, 1953. pp. 4 + 2 dgms. 6 refs. P.O.

A hole is drilled in the wooden part for the close reception of the screw and a condensation product of a di-primary alcohol and urea is introduced into this hole, the resulting urethane-containing melt being reacted with formaldehyde. The screw is then inserted into the hole and the condensation product hardened.

824.8. Glues and Gluing

See also Nos. 4186 *et seq.*

4138. Horioka, K., and Horiike, K. **[Research on the mechanism of adhesion in wood. Parts 1, 2.]** *Wood Ind., Tokyo* 9 (2; 3), 1954 (75–9; 118–22). 12 refs. [Jap.jap.e.] P.R.

Discusses experiments on the physical and chemical factors involved.

4139. Perry, T. D. **Methods of testing glue joints.** *Wood, Chicago* 58 (11), 1953 (32, 34). P.R.

Discusses, in the form of questions and answers, the procedures and frequency for testing strength and durability, and the significance of various shear tests.

4140. Sergev, S. **Shearing strength tests of glued joints.** *Trend in Engineering at the University of Washington, Seattle* 5 (2), 1953 (22–3). L.S.

Results with specially prepared test pieces made of 'C' clear Douglas Fir, moisture content 15–20%, are graphed. Two outside pieces 2in. thick and of varying width and one inside piece 2 × 5½in. were glued together. The grain in the outside pieces was parallel, and that of the inside pieces was orientated to give different angles with it (from 0 to 90°). It was found that: (1) moisture-resistant casein glue yielded higher shear strength values than phenolic resin glue, for practically all grain/grain angles; (2) for either glue, strength values were at a maximum with a grain/grain angle of 22½°; values at 0° and 90° were almost identical.

4141. **Glues for wood in archery uses.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 226 (rev.) 1952. pp. 4. 2 refs. P.R.

4142. **Australian Standard Specification for synthetic resin adhesives for plywood (phenolic and aminoplastic).** *Aust. Stand.* No. *K*.88–1952, 1953. pp. 14. P.R.

4143. Egner, K. Sichtbarmachung von Faserschädigungen durch sauer ausgehärtete Kunstharzleime. **[Demonstration of damage done to fibres by acid-hardened synthetic-resin glues.]** *Extr.* from *Holz-Zbl.* 78 (135), 1952 (1857–8). [G.g.]

In the author's test method, shavings of 200 × 200 × 0·15 mm. are prepared by planing from straight-grained, clear boards (with a growth-ring angle of ca. 45°). After conditioning for several hours at 20° C. and 65% air humidity (normal climate), the median thirds of the shavings are coated on both sides with the glue-hardener mix, the amount of glue used yielding a hard coating 0·2 mm. thick. The coated shavings are then subjected for 48 hours to the normal climate, and then for 48 hours to 80° and ca. 100% relative air humidity (r.h.), 5 hours at 70° in a drying oven = ca. 5% r.h., and finally another 48 hours in normal climate. Next the non-coated portions of the shavings are subjected to the folding test (sharp bends of 90°), the bends starting at the edge of the glue coating and being made at 5-mm. intervals. Appraisal of damage to the wood is based on the colour of the non-coated portions, and, particularly, the behaviour during folding (bending or breaking). Spruce, Pine and Fir shavings without and with glue were tested. With resorcinol glue RI, the same results were obtained as without glue. Phenol or cresol synthetic-resin glues gave poorer results, and so did urea resin glues. The pH-value tests fully corroborated these findings: pH was very low in the phenol- and urea-base glue mixes and kept on falling (down to 1·6–2·6), whereas it was constant at 5·9 for the resorcinol glue. When the shavings with glue coatings were subjected to *dry* conditioning (9 days at 70° and ca. 5% r.h., followed by 4 days in normal climate), and when the moisture content of wood was not high, the acid-hardened phenol glues did not bring about noticeable damage.

4144. Plath, E. Die Prüfung von PF-Harzen auf Säureschädigungen. **[Testing of phenol-formaldehyde resins for damage caused by acids.]** *Holz Roh- u. Werkstoff* 11 (12), 1953 (466–71). 12 refs. [G.g.] P.R.

Tests on parallel (lap) glued test pieces according to German standard 53254, subjected successively to different climates (combinations of temperature and humidity), showed that the free acid (from the hardener) can, in particularly unfavourable conditions, contribute to strength loss, by causing hydrolytic splitting of the wood polyoses. In most cases, however, it seems that the strength drop is due to shrinkage of the resin layer. Both dangers can be remedied by different measures (discussed).

4145. Goto, T., and Kadita, S. **[Studies on wood adhesives. I. Extending phenolic-resin glues with walnut-shell flour.]** *Wood Res., Kyoto* No. 9, 1952 (32–41). 14 refs. [Jap.jap.e.]

4146. Motone, N., Goto, T., and Kadita, S. **[Studies on wood adhesives II. Extending phenolic resin glues with protein material.]** *Wood Res., Kyoto* No. 10, 1953 (42–54). 5 refs. [Jap.jap.e.]

Results of experiments on properties of glues extended with soybean and corn meal and wheat gluten are given in tables and graphs [with English legends]. Optimum gluing conditions are given. Satisfactory glues for exterior plywood were obtained at low cost using these extenders.

4147. Toriumi, H., and Mori, S. **[Studies on urea resin glues (Part 1). Experiments on gluing characteristics and joint capacity of urea-resins formed by condensing 1 mol of urea with 1·5 mols of formaldehyde.]** *Wood Ind., Tokyo* 9 (6), 1954 (272–6). 8 refs. [Jap.jap.e.] P.R.

4148. Horioka, K., Sugano, M., and Horiike, K. **[Studies on plywood. Report No. 3: Waterproof plywood glued with urea-formaldehyde resin.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 67, 1954 (115–36). 17 refs. [Jap.jap.e.]

[Cf. *For. Abstr.* 14 (No. 2685).] Tests were made on properties of 15 urea resins, the effect of different factors in manufacture and of wood species on glue strength, the properties of different extenders and the joint strength of boiled specimens glued with urea resins containing varying proportions of melamine and dried blood. *From authors' summary.*

4149. Goto, R., and Kozai, Y. **[Studies on adhesion in wood. V. Application of acetone-formalin resin as an adhesive. 5.]** *Wood Res., Kyoto* No. 9, 1952 (14–20). 3 refs. [Jap.e.]

Presents the results of studies on the effect of cleaning the surface before gluing, of the use of NaOH solution as a hardener, and of weathering on adhesive strength. [Cf. *For. Abstr.* 14 (Nos. 2687–8).]

4150. Nodzu, R., Goto, R., and Kozai, Y. **[Studies on adhesion in wood. VI. Application of acetone formalin resin as an adhesive. 6.]** *Wood Res., Kyoto* No. 9, 1952 (21–31). 7 refs. [Jap.e.]

Discusses the use of a mixture of the resin with solid $Ca(OH)_2$ as a hardener and optimum conditions for its application.

4151. Nakatsuka, T. **[Ripening of viscose adhesive IV. After-sulphidation treatment.]** *J. Jap. For. Soc.* 35 (1), 1953 (16–8). 3 refs. [Jap.e.]

Cf. *For. Abstr.* 15 (No. 732).

4152. Horioka, K., Iwashita, M., and Kato, S. **[Studies on plywood. Report No. 5. An experiment on edge-gluing veneer.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (1–14). 10 refs. [Jap.e.]

[Cf. *For. Abstr.* 15 (Nos. 4148, 4157.] A new machine for edge-gluing is described and illustrated. *From authors' summary.*

4153. Jones, I. **Electrical resistance heating for setting adhesives.** *Information Report, Technical Information Service, Furniture Development Council, London* No. 8, [*n.d.*]. pp. 22 + [1] + 12 dgms., 5 gphs. 13 refs. P.R.

A survey of five methods.

4154. Hafner, T. Der heutige Stand der Hochfrequenz-Technik in der Holzindustrie. **[The present status of R.F. techniques in the timber industry.]** *Mitt. öst. Ges. Holzforsch.* 6 (1), 1954 (1–5). [G.] P.R.

4155. Flatt, H. W. **High-frequency jig construction [used in glue-line setting].** *Wood* 19 (4; 5), 1954 (174–6; 212–3).

4156. Yavorsky, J. M. **The effects of moisture content and machining of wood on R.F. gluing processes.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (36–9). 13 refs.

Summarizes results of research on moisture content and machining requirements. [Cf. *For. Abstr.* 14 (No. 693).]

4157. Shigesawa, S. **[Studies on plywood. Report No. 4. The effects of treatment with Na pentachlorophenate on the glue joints and durability of plywood.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 67, 1954 (137–52). 13 refs. [Jap.jap.e.]

Tests of joint strength, water resistance, and resistance to fungus attack were made on plywood from 4 timber species, treated with 2–5% solutions of Na-pentachlorophenate by steeping for 1–20 hr., and glued with different types of adhesive. [Cf. *For. Abstr.* 14 (No. 2685).] *From author's summary.*

827. *Bending. Moulding (other than by Cutting)*

4158. Saito, Y., Kitahara, K., and Yamazaki, S. **On the relation of boiling conditions and compressive deformation in wood bending.** *Trans. 61st Mtg. Jap. For. Soc.* 1952 (225–6). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 3, 1952/53 (1954), (89). [E.]

Tests were made on *Quercus crispula*, *Fraxinus mandshurica* and *Zelkova serrata*. When boiling time was prolonged and the temperature kept constant at 98° C. the stress/strain curve tended to lie rather lower, but if the process was continued too long, the wood became brittle and its maximum load decreased. When the temperature of the water was changed [increased?] and the time kept constant at 50 min. the stress/strain curve also tended to lie rather lower. The type of rupture scarcely varied with the temperature. The wood was more easily softened at the higher temperatures.

4159. Saito, Y., Kitahara, K., and Kano, S. **A fundamental study on the drying conditions of wood-bending.** *Wood Ind., Tokyo* 7, 1952 (440–3). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 3, 1952/53 (1954), (89). [E.]

In a study on the factors affecting the opening out of bent wood after release from the form—moisture content and temperature at time of release, and length of time on the form—the following results were obtained: (1) m.c. at time of release should be below 10% and temperature above 80° C.; (2) time on the form has little effect on opening out; and (3) opening out from quarter-grain is greater than from flat-grain bending.

829.1 *Finishing*

4160. Letsky, B. M. **Modern wood finishing and some of its problems.** *Cabinet Mkr.* 1954 (2843), (235–7). P.R.

Discusses in some detail the following subjects: stain-fillers, filling media, resin sealers, and hot lacquer plants, and describes the main defects liable to occur in mass-production wood finish.

4161. Boujard, H. Procédé de traitement et d'application pour l'imprégnation et l'imperméabilisation de liège, bois, papier, carton etc., et objets traités suivant ce procédé. **[Method of impregnating and proofing of cork, wood, paper, cardboard, etc.]** *French Patent* No. 990,524, Sept. 24, 1951. pp. 2. [F.] P.O.

Synthetic coatings (e.g. polyhexamethylene-adipamide, polyvinyl films, ethylene polymer etc.) are applied to the articles by absorption, soaking, spraying etc.

4162. **Pest control by lacquer.** *New Commonwealth* 26 (9), 1953 (443–4). O.G.

Success has been attained by the Colonial Insecticide Research Unit in the effort to produce a surface coating for buildings and furniture that will act as a contact insecticide. Earlier claims that 'insecticidal paints' had been produced were discredited and the whole enterprise has for some time been treated with scepticism. The new preparation is a lacquer, readily applicable as a final finish. Tsetse and house flies died some hours after a momentary contact in experimental conditions, some species of mosquito after 30 seconds' contact, the yellow-fever carrier after 4 to 8 minutes' contact, flour beetles after 1 hour's contact. Work on other pests is giving encouraging results. Insecticides (DDT, dieldrin, BHC) are incorporated with suitable solvents in urea-formaldehyde resins, to produce lacquers that can be applied by brush or other conventional methods. The lacquers dry by a 'curing' process brought about by the use of an acid accelerator added just before the lacquer is put on. The resin is used as a reservoir for the insecticide, which is held in solid solution in it. The lacquers harden completely in about 4 hours from time of application, and if the coating is then stimulated by rubbing or stroking, a fine 'bloom' of the insectide is formed on the surface of the hard film of lacquer. If rubbed off, the bloom quickly forms again and this process continues throughout the life of the lacquer. The rate of blooming, and therefore the insecticidal life of the lacquer, can be controlled within fairly close limits. One gallon of an insecticidal lacquer will treat about 800 sq. ft. and would cost about £4. Preliminary experiments have been carried out with repellents and attractants. Other experiments were successful in controlling barnacle settlement in oyster-settling sites. Wooden poles coated with lacquer and placed in the inter-tidal zone of an estuary remained barnacle-free for two years. A patent application has been filed jointly by the National Research and Development Corporation and British Industries Plastics Ltd., and licenses have been issued to a number of British manufacturers.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

See also No. 3962.

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 4234, 4244–9, 4278, 4285, 4292.

4163. Arief, S. M. Hasil^2 pemeriksaan beratnja kaju bakar kereta api. **[Investigations on the weight of firewood.]** *Repr.* from *Rimba Indonesia* 2 (10/12), 1953 (413–23). [Jav.e.] (*Commun. For. Res. Inst., Bogor* No. 41, 1953).

Measurements in 1938 on Teak firewood showed an average weight of 555 kg./cu.m. piled measure for the assortment 80/200 (split firewood in ½-m. sticks with an end area 80–200 sq. cm.), piled normally. There was little difference between the wet and the dry season. Investigations in 1939 showed an average for 4 assortments (including one of thinnings) of 531 and 497 kg./cu.m. for the wet and dry season respectively. The average solid contents for the wet and dry season respectively were 750 and 750 cu. dm./cu.m. piled measure in 1938 and 736 and 734 cu. dm. in 1939. There was little difference between the different assortments, 80/200 averaging 750 cu. dm., and 10/24, 25/79 and 9/15 (½-m. lengths with respectively end areas of 10–24 or 25–79 sq. cm., or average diam. of 9–15 cm.), 735 cu. dm./cu.m. piled measure. Data for sp. gr. in the wet and dry season were 0·74 and 0·74 in 1938 and 0·72 and 0·68 in 1939. The average weights obtained (555 kg. for 80/200 and 500 kg. for the other 3 assortments) differed from those for 1921 (446 kg.) and 1922 (440 and 450 kg.), probably because of differences in measurements of the assortments and in the length of time between felling and measurement. [The tabulated results have English legends.] *From author's summary.*

4164. Woods, R. P. **Use of timber in docks and harbours. Factors in favour of wood for port works.** *Dock and Harbour Authority, London* 33 (382), 1952 (114–7). 10 refs. L.S.

Discusses various uses of timber in dock and harbour structures, the species of timbers used for these purposes in the U.K., Australia, India, and Africa, and the timber sizes involved; also the efficacy and cost of preservatives against marine borers.

4165. Walters, C. S. **Choosing poles for pole-type structures.** *For. Note Ill. agric. Exp. Sta.* No. 46, 1954. pp. 2.

4166. Bloecker, W. E., and Bullard, W. R. **Some aspects of joint use of wood pole lines with increasing line voltage.** *Communication and Electronics, Easton, Pa.* 1953 (9), (709–12). 8 refs. X.

Experience indicates that, as far as telephone-plant damage is concerned, there is little relationship between the extent of damage and the voltage carried, in cases where power lines have been added to telephone.

4167. **Western Larch poles with counterclockwise spiral grain show less distortion in the top or cross-arm section than those with clockwise spiral grain.** *Rep. Nth. Rocky Mt. For. Range Exp. Sta. 1953*, [1954] (10–1).

4168. BEESLEY, J. **Sub-project P. 2–2. A survey of the causes of service failure of crossarms throughout Australia. Progress report No. 6. Inspection (1952) of recovered [removed from service] crossarms in Tasmania.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 12 + 8 photos. Limited distribution. P.R.

In Tasmania, 27% of removals were in serviceable condition, 12% failed from splitting, 1% from pin wear, breakage, etc., and 60% from decay.

4169. BEESLEY, J. **Sub-project P.2–2. A survey of the causes of service failure of crossarms throughout Australia. Progress report No. 5. Inspection (1952) of recovered crossarms in South Australia.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 17 + 12 photos. Limited distribution. P.R.

In South Australia, 23% of removals were still in serviceable condition, 44% had failed from splitting, 1% from termite attack, 30% from decay, and 2% from other causes.

4170. WYMOND, A. P. **Project P.4. Fence post investigations. Sub-project P. 4–7. A survey of fencing practice in Australia in 1953 (first report).** Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 38 + 1 map.

Summarizes replies to a questionnaire to farmers and graziers in 6 states on species, cost, life and causes of failure in posts.

832. *Mills, Their Functions and Products*

4171. DUNLAP, M. E. **Methods of controlling humidity in woodworking plants.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1612 (rev.) 1953. pp. 4 + 3 photos + 1 tbl. P.R.

Cf. *For. Abstr.* 8 (No. 1314).

4172. BROWN, H. R. **Dust-hazard control in woodworking plants.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (65–7).

Discusses laboratory tests on the ignition and explosion of wood and bark dusts and methods of preventing or reducing damage from such hazards in woodworking plants.

832.1. Sawmills and Planing Mills

See also Nos. 3602, 4122 *et seq.*, 4301, 4306.

4173. ANDREWS, G. W. **Power at the headsaw.** *Timber of Canada* 14 (8), 1954 (35–8).

Average power requirements in h.p. are presented for sawing 19 Canadian species (carriage speed 170 ft./min., saw speed 700 r.p.m.) and curves are presented showing power requirements for various combinations of saw and carriage speeds based on green White Pine. [Cf. *For. Abstr.* 14 (No. 3777).]

4174. **New sorter spurs lumber output.** *Wood, Chicago* 59 (4), 1954 (38). P.R.

Illustrated description of a new machine which sorts boards according to widths, length and grade.

4175. HORTON, L. W., *et al.* **Comparative time required to saw 1 M bf. from different log sizes.** *Tech. Note Univ. Me. For. Dep.* No. 25, 1954. pp. 2.

4176. THOMAS, D. P. **Small band mill plus small logs equals increased lumber yield.** *Bull. Inst. For. Prod. Wash.* No. 16, 1954. pp. 15.

A study was made of the conversion of 596 logs (average diameter 11 in. and length 16 ft.) in a small 5-ft. band mill with an average daily production of 30,000 bd. ft. The results gave an overrun of 39% above the net log scale. Labour requirements were 2·3 man-hours/1000 bd. ft. for a 9-man crew.

4177. MCCLAY, T. A. **Lumber grade yields in the Loblolly-Shortleaf Pine type by the Southern Pine log grades.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 37, 1954. pp. 12.

The average % lumber grade recovery by log diameters and grades [see *For. Abstr.* 15 (No. 4305)] based on 1288 Loblolly and Shortleaf Pine logs is shown in tables and graphs; also board width % and log quality index.

4178. THUNELL, B. Tekniska produktionsförhållanden inom sågverksindustrien. [**Technical production conditions in the sawmill industry.**] Svenska Träforskningsinstitutet (Träteknik), Stockholm. 1953. pp. 52. [Sw.] P.R.

Compares, in tables and graphs, figures for output, costs, labour etc. for 8 types of sawmill, ranging from those with a single circular saw to those with 6 frame-saws (3 for slabbing), and shows the type of mill that can most economically be used for outputs ranging from 0 to 975 standards (circular sawmills of different sizes) and from 975 to 5000 standards (frame sawmills).

4179. KORCZEWSKI, A. O., and SZMIT, J. M. Analiza wpływu czasu trwania wstępnych czynności przetarcia na wydajność traka. [**Analysis of the effect of the duration of preliminary operations on frame-saw output.**] *Sylwan* 97 (5), 1953 (328–36). 1 ref. [Pol.pol.russ.]

The preliminary operations include: detaching and taking the log trolleys to the log ramp, rolling, loading and securing the log, and conveying it to the frame-saw. It is important to reduce the time taken over these preliminaries to at most 32 sec. For high-speed frame-saws (300 revs./min.) the optimum is 22 sec., with another 22 sec. for flat-sawing the log portion remaining after the trolley has been withdrawn from under it. At higher feed values, gaps occur between successive log faces, but the total output still increases up to a limiting value.

4180. CHURCH, J. W. **Research in portable sawmill design.** *Repr.* from *Canada Lumberman, Toronto* Dec., 1953. pp. 4.

Abstract of a paper presented to the Forest Products Research Society. The main types of portable sawmill are described, and desirable lines of future development outlined.

832.2. Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 4060, 4080, 4138 *et seq.*,
4194, 4290, 4295, 4330.

4181. Fleischer, H. O. **Shrinkage and the development of defects in veneer drying.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (30–4). 6 refs.

Discusses and shows in graphs and tables the results of experiments on the effect of drying conditions (humidity, temperature and air velocity) on shrinkage and seasoning defects. [Cf. *For. Abstr.* 15 (No. 1880).]

4182. England, R. F. **The cyclical exposure test as a tool in laminating quality control.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (61–5). 12 refs.

Discusses the development of, and describes, the 12-day delamination test used at the Puget Sound Naval shipyard. This consists of 3 cycles with a soaking period of 7½–7¾ hr. divided equally into two alternating periods each of vacuum and pressure and a drying period of 88 hr. Possible means of shortening the test are considered.

4183. Sekhar, A. C. **Elastic constants of plywood.** *Comp. Wood* 1 (2), 1954 (32–7). 15 refs. P.R.

Results are graphed of experiments conducted by the method of free vibrations on 18 × 1 in. strips of commercial Birch, Maple, and Gaboon plywoods (with 3 or 5 plies and different thicknesses), the grain of the face veneer forming different angles with the longitudinal axis of the strip. The lengths chosen for Young's modulus and rigidity modulus were 40 cm. and 10 cm., respectively. It was found, *inter alia*, that the modulus of rigidity passes through a maximum when the angle between the grain and the axis of the test-pieces varies from 0 to 90°; this maximum had a greater value for 5-ply than for 3-ply wood. Experimentally determined mean values of Young's moduli agree fairly well with the calculated ones, the main deviation occurring at lower values of the moduli; the individual results of experiments are considerably scattered.

4184. Grossmann, P. U. A. **The recovery of plywood after compression at elevated temperatures.** *Aust. J. appl. Sci.* 4 (1), 1953 (98–106). 9 refs. P.R.

Plywood panels of *Araucaria cunninghamii* were pressed in the oven-dry condition at 160–200° C., and their recovery at room conditions and at the pressing temperature was observed. The decrease in residual deformation with increased recovery temperature was insignificant; heating immediately after removal of stress caused greater recovery than later heating. Specimens that showed no further recovery at either temperature were subjected to a temperature 40° C. above the pressing temperature, and (small) thermo-recovery was observed. Large increase in recovery was found in specimens that were soaked in water and re-dried. *From author's summary.*

4185. Hirai, S., Shimizu, T., and Takuwa, N. **Studies on plywoods. X. Warping of plywood in relation to the condition of core-veneer.** *Wood Ind., Tokyo* 7, 1952 (393–7). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 3, 1952/53 (1954), (86–7). [E.]

[Cf. *For. Abstr.* 15 (No. 730).] An experiment on the degree of cupping and twisting of 3-ply, 6-mm. plywood of *Fagus crenata* showed that the plywood with thicker core (1/4/1) had little cupping compared with that with a thinner core (2/2/2). When the moisture content of the core is below 10% or above 18% twisting is slight in the thick-cored or the thin-cored plywood respectively. In both plywoods, warping is slight and there are few checks in cutting when m.c. is below 10%.

4186. Campbell, R. L. **Loading and unloading of multiple opening hot presses.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (58–61).

Describes devices for loading and unloading.

4187. Grangaard, D. H. (to Paper Patents Co.). **Process of manufacturing fibrous sheet covered plywood.** *U.S. Patent* No. 2,656,296, Oct. 20, 1953. pp. 22 + 8 dgms. 9 refs. P.O.

Paper having a weight of 100–210 lb. for 500 sheets of 24 × 36 in. and a density of 0·55–0·88 g./c.c. is impregnated with thermosetting resin, dried, heated under pressure, applied to a defect-containing face veneer and subjected, with other plies, to pressure and heat to form plywood.

4188. Emmett, J. A. **Plywood's place in the boating field.** *Veneers & Plyw.* 48 (1), 1954 (8–9, 36 . . 43). P.R.

Stresses the suitability of plywood covered with 'Fiberglas' cloth as a covering material for hulls, decks and superstructures in bigger boats.

4189. Fujino, K., and Hirota, T. **[Studies on metal/wood plyplate. III. Strength of aluminium/wood plyplate.]** *Wood Res., Kyoto* No. 9, 1952 (63–7). [Jap.e.]

Cf. *For. Abstr.* 13 (Nos. 3385–6).

4190. Denig, F., and Arnold, W. P. (to Koppers Company, Inc.). **Laminating wood.** *U.S. Patent* No. 2,563,821, Aug. 14, 1951. pp. 10. 10 refs. P.O.

Individual wood laminae are creosoted, their gluing faces are surfaced so as to remove a surface layer ca. $\frac{1}{64}$–$\frac{1}{16}$ in. thick, and then the laminae are glued together.

4191. Freas, A. D., and Selbo, M. L. **Fabrication and design of glued laminated wood structural members.** *Tech. Bull. U.S. Dep. Agric.* No. 1069, 1954. pp. 220. 28 refs.

Intended primarily as a guide to the manufacture and design of glued laminated members such as beams, arch ribs and truss parts. Part 1 describes properties and choice of glues and gluing processes; part 2 presents the principles of design of laminated structural members. The bulletin is illustrated by 100 photographs, diagrams and graphs.

4192. **Standard specifications for the design and fabrication of structural glued laminated lumber.** West Coast Lumbermen's Association, Portland, Ore. Rev. ed., 1952. pp. 12. 14 refs. P.R.

832.3. Match Factories

4193. Pillow, M. Y. **How growth of White Pine affects its properties for matches.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*1950, 1953. pp. 4 + 3 photos. P.R.

Matchsticks consisting of early wood only have very small strength; hence lumber with less than 5 rings/in. should not be used for matches. Some types of compression wood (with large angles of fibre strands) should also be avoided because of increased brittleness.

833. *Timber in Buildings and Engineering Structures* (*Manufacture and Use*)

See also No. 3966.

833.1. Building Components and Fittings: General

See also Nos. 4191–2.

4194. Fachheft 'Holz im Bau'. [**Special issue: 'Wood in construction'.**] *Bauzeitung, Stuttgart* 58 (10), 1953 (339–78). [G.] D.S.I.R.

Includes the following articles: Present status of standardization work on windows, doors and drawers on rollers (*H. Weingarten*); Planed-board flooring (*K. Hempel*); Parquet (*Wolff*); Wood blocks for industrial floors (*Wegelt*); Wood fibreboards in modern building (*K. Kummer*); Plywood finds more and more outlets (*Koop*); Chipboards (*Koop*); and Wood preservation (*K. Storch*).

4195. **The timber industry in the U.S.A. II. Timber and the building industry**. Organisation for European Economic Co-operation, Paris. 1953. pp. 106. Price 6*s*.

Reports on a tour by Technical Assistance Mission No. 59A of the building industry in eastern U.S.A. under the sections: marketing of timber; utilization of timber and allied materials; and general information (labour and research).

4196. Luxford, R. F. **Use of Engelmann Spruce for house construction**. *Rep. U.S. For. Prod. Lab., Madison* No. *R*1944–1, 1953. pp. 3. P.R.

Although this species can be used for many construction purposes, its chief uses will probably be for studding, sub-flooring, roof boards, and wall sheathing.

4197. Egner, K. Technologische Grundlagen der Dreieck-Streben-Bauweise. [**Technological principles of wooden construction members involving the use of triangulated [tongue-and-groove-glued] web elements.**] *Holz-Zbl.* 80 (11), 1954 (111 . . 114). 20 refs. [G.g.]

[Cf. *For. Abstr.* 15 (No. 1894).] Discusses the choice of wood and accuracy of fitting, the choice of glues and their properties, the gluing procedure, the load-bearing capacity of the triangular-web joints, and the safety measures to be taken.

4198. Kinzey, B. Y., Jr. **Tests on the design of wood box columns.** *Civil Engineering, London* 46 (535–537), 1951 (41–4; 108–10; 185–7). 7 refs. P.O.

Presents tabulated and graphed results of tests on the behaviour of box columns in order to determine formulae for their design and to make an economic comparison of the utilization of lumber in box columns and in columns of other types having equivalent load-carrying capacity. The wood used was air-seasoned, dense, selected Southern Pine.

4199. Luxford, R. F. **Rigidity and strength of frame walls sheathed with fiberboard.** *Rep. U.S. For. Prod. Lab., Madison* No. 1151 (rev.) 1953. pp. 6 + 7 photos + 1 dgm. + 4 tbls. P.R.

Tabulates the results of mechanical tests with different test panels.

4200. Strenge, F. A. **Wood siding for buildings.** *Rep. U.S. For. Prod. Lab., Madison* No. 1929 [*n.d.*]. pp. [1] + 11 + [1] + 3 tbls. 12 refs. P.R.

Discusses kinds, qualities and grades of siding, selection of right grades, effect of defects on paint, and application and care of siding. The bevel, and drop, siding grades of principal commercial species are tabulated, and native woods are classified for ability to hold aged coatings of house paints.

833.5. Wood in Bridges, Culverts etc.

4201. Yamawaki, S. [**The measurement of stress in vertical members and the deflection at the middle span of a Howe-type deck truss using wire resistance strain gauges.**] *Bull. For. Exp. Sta., Meguro, Tokyo* No. 65, 1953 (115–26). [Jap.e.]

Measurements were made on a wooden bridge on the Misakubo forest railway subjected to static or moving loads. Results are shown in tables and graphs [with English legends]. *From author's summary.*

833.8. Wood in Hydraulic, River and Marine Uses

See No. 4164.

834. *Shingles. Cooperage. Packing Containers.* (*Manufacture and Use*)

See also Nos. 4054, 4080, 4250–1.

4202. Rüb, F. Spezialmaschinen für die Kistenfabrikation. [**Special machines for the manufacture of packing cases.**] *Holztechnik* 34 (5), 1954 (231–4). [G.]

Illustrated description of the design and operation of boxboard-printing machines, machines for nailing with corrugated-strip nails and stapling machines (for larger and smaller dimensions). The manufacturers of the machines are not named.

4203. Bielczyk, S. Wytrzymałość niektórych typów skrzyń i próby ich zracjonalizowania. [**Strength of some types of wooden boxes, and their tentative rationalization.**] *Roczn. Nauk leśn.* 3, 1953 (39–76). 7 refs. [Pol.pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 98.)

Four types of boxes most frequently used in Poland were tested for bending, shock resistance, and rigidity. The possibility of more economical use, e.g. by introducing thinner dimensions, is discussed.

4204. Millett, R. S. **The design of wooden boxes.** *Aust. Timb. J.* 19 (12), 1954 (884 . . . 912, 940). [Forest Products Laboratory, Ottawa.]

Includes data on design, timber, especially Canadian species, nailing and testing.

4205. **Common styles of nailed-wood boxes.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 164 (rev.) 1953. pp. 3. P.R.

4206. **The nailing of wood boxes.** *Tech. Note U.S. For. Prod. Lab., Madison* No. *B*-10 (rev.) 1953. pp. 4. P.R.

4207. **Moisture content and storage affect strength of nailed wood boxes.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 128 (rev.) 1953. pp. 1. P.R.

4208. **The wood pallet industry, its development and progress toward standardization.** *Rep. U.S. For. Prod. Lab., Madison* No. 1957, 1953. pp. 20 + 1 dgm. 21 refs. P.R.

An outline of the development of the pallet industry, and a summary of pallet designs and specifications. Results of research are presented, and a glossary of terms and a selected bibliography are included.

835. *Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.*

See also No. 4141.

4209. Smith, W. P. **The striking tool handle and handle blank industry in the Tennessee Valley area.** Division of Forestry Relations, T.V.A., Norris, Tenn. Rep. No. 204–52, 1952. pp. 19.

4210. Anvery, S. A. A. **Forests and cottage industries (comb making in Campbellpur).** *Pakistan J. For.* 4 (1), 1954 (21–7).

836. *Furniture and Cabinet Making. Carving. Marquetry. Wooden Ornaments.*

4211. Byrnes, N. B. **Furniture timbers of N.S.W.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 7 (2), 1953 (12–6).

Includes a list of some 50 woods, grouped by their colour, with information on working properties, susceptibility to insect attack, weight and natural distribution, and a further list of 17 woods suitable for turnery work.

838. *Vehicles (including Ships, Boats, Aircraft)*

See No. 4188.

839.8. *Industrial Waste Wood, its Processing and Uses*

See also Nos. 4172, 4330 *et seq.*, 4353, 4363.

4212. Babcock and Wilcox Ltd. **Improvements in or relating to vapour generators.** *Brit. Patent* No. 697,582, Sept. 23, 1953. pp. 4 + 6 dgms. P.R.

The vapour generator comprises a vertical furnace chamber the lower portion of which is divided into a number of refuse-(hogged fuel, wood-bark, slabs, shavings, sawdust) burning cells.

4213. Vorreiter, L. Grundlegende Eigenschaften von Sägespänen. **[Fundamental properties of sawdust.]** *Holz-Zbl.* 79 (105), 1953 (1127–8). 26 refs. [G.]

Illustrates, tabulates, and graphs some of the results of the author's recent research. The screen analysis of Sprucewood sawdust of 10–12% moisture content, obtained from a frame-saw and from a Wigo circular saw has yielded two completely different frequency histograms; particles of sawdust from frame-saws are much smaller in size than those from circular saws; the shape of the former is oblong and splinter-like, that of the latter nearly cubical (the coarsest fraction excepted). The bulk density of sawdust (poured into a measuring cylinder and shaken down to promote settling) increases logarithmically as the degree of fineness of the sawdust increases, and so does the maximum water imbibition determined as the amount of water absorbed when all sawdust particles shaken with water have sunk down. Empirical formulae have been derived for the dependence of bulk density and water imbibition on particle size for both frame- and circular-saw sawdust. The pH of water mixed with sawdust falls (and the amount of acetic acid extracted from wood rises) as the time of extraction and the fineness of particles increase; an empirical formula for these relationships is also presented.

4214. Suzuki, S. **[Treatment for sawdust.]** *Japanese Patent* No. 2236, May 20, 1953. [Jap.] From *abstr.* in *Chem. Abstr.* 48 (8), 1954 (4800*c*). P.R.

One hundred g. of *Cryptomeria* sawdust is immersed in 200 g. of 5% $FeCl_3$ for 3 hours at 50° C., dried, then immersed in 200 g. of 0·2% Na alginate and dried again. The product is suitable for use in the preparation of nailing concrete.

4215. Salomon, M. **The accumulation of soil organic matter from wood chips.** *Proc. Soil Sci. Soc. Amer.* 17 (2), 1953 (114–18). 12 refs. L.S.

Pine (*Pinus strobus*) or Oak (*Quercus velutina*) chips were mixed with a sandy loam topsoil at a rate of 10 tons/acre and the resulting level of NO_3-N and the soil reaction were observed. For the experiments, a series of galvanized-iron cylinders 18 in. in diam. and 36 in. deep were sunk to ground level and filled with a silt loam subsoil and 6 in. of a Merrimac sandy loam, this topsoil being mixed with the chips. Oak chips decomposed more rapidly than Pine. Although 55 to 85% of the wood chips decomposed, organic matter accumulation proved to be small; there was some indication of its being greater in soils at pH 5·0–5·5 than in those at pH 6·0–6·5. The relationship between C as determined by the H_2CrO_4 titration method, and total C, did not change appreciably after 2 years of chip decomposition. Chip treatment caused no significant difference in the amount of H_2CrO_4-oxidizable C and the effect on total soil N and soil reaction was small. Accumulations of NH_3 were negligible. After 2 years of decomposition the addition of the equivalent of 150 lb. N/acre gave highly significant increases in yields of beet and spinach. Wood chip residues did not depress plant growth. Small chips gave higher yields than large chips. The addition of 100 and 150 lb./acre NO_3–N to beet and spinach respectively, overcame any depressing effects of additions of 10 tons of small Pine chips. With low available N, wood chips depressed the growth of beet and spinach, though this depressing effect ceased after 12 months' decomposition. *From author's summary.*

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

See also No. 3613.

4216. **The timber industry in the U.S.A. IV. Treatment and preservation of timber.** Organisation for European Economic Co-operation, Paris. 1953. pp. 95. Price 6*s*.

Reports on a tour by Technical Assistance Mission No. 59B and contains sections on: characteristics of the timbers treated (species, forms and dimensions); antiseptics; handling and reinforcing railway sleepers; handling of poles; drying methods; preservative treatment of timber (methods and equipment); use of wooden sleepers for railway tracks; use of timber for overhead lines; use of treated structural timber; laboratories; miscellaneous; production costs; and conclusions.

841. *Wood Preservation*

See also Nos. 4035, 4055, 4157, 4164, 4194, 4260, 4278, 4285.

4217. THEDEN, G., and BECKER, G. Holzschutz—Grundlagen, Begriffe. Erläuterungen und Bemerkungen zum Normblatt DIN 52175. **[Wood preservation—basic principles and ideas. Explanations and remarks regarding German standard DIN 52175.]** *Holz-Zbl.* 80 (54), 1954 (671–2). [G.]

The standard was scheduled for print in April, 1954. Its three main sections are: (1) the term 'wood preservation', (2) damage done to wood, and (3) protective measures.

4218. BELLMANN, H. Über das Problem der gegenseitigen Verträglichkeit von Holzschutzmitteln. **[Mutual compatibility of wood preservatives.]** *Schädlingsbekämpfung, Hamburg* 45 (1), 1953 (1–8). 4 refs. [G.] I.I.E.

The processes that may occur in wood already impregnated with a preservative (*A*) when it is re-impregnated with another (*B*) are discussed in detail, and the difference is stressed between processes occurring in wood and *in vitro*. If *A* and *B* react chemically (but not too violently), the probable final outcome of the second impregnation is the formation of the following zones in the wood: (1) on the surface, small amounts of unchanged *B*, (2) in the marginal zone (near the surface) mainly reaction products with some residual *B*, then (3), zone with only the reaction products, (4) a zone containing the reaction products with residual *A*, and (5) a zone with *A* only. The above picture is obtained if *B* does not penetrate as deeply as *A* and the reaction products are sparingly soluble. The various possible forms of zone formation are presented graphically in a table as functions of the following factors: penetration and amount of *B*, solubility of *A*, rate of reaction (none, moderate, rapid, violent), and solubility and penetration of the reaction products. Another table gives general information on the mutual compatibility of the following basic substances: NaF, KF, NH_4HF_2, KHF_2, NH_4 phosphate, $(NH_4)_2SO_4$, $MgSiF_6$, $ZnSiF_6$, $Ca(OH)_2$, Na pentachlorophenate, K_2CO_3/Na_2CO_3, and $ZnCl_2$, and the toxicity of their reaction products. Reactions between many pairs of these chemicals are discussed in detail. The solubilities of ca. 60 basic preservatives, subsidiary constituents, and reaction products are tabulated.

4219. BLEW, J. O., JR. **Wood preservatives.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*149 (rev.) 1953. pp. 12. 1 ref. P.R.

Contains sections on: coal-tar creosote; other wood-preserving oils; water-borne preservatives; paints and varnishes, and water-repellent preservatives.

4220. COLLEY, R. H. **Correlating evaluation tests of wood preservatives.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (43–51). 24 refs.

Cf. *For. Abstr.* 15 (No. 1948).

4221. SNOKE, L. R. **Soil-block bioassay of a creosote containing pentachlorophenol.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (55–7). 4 refs.

Preliminary results suggest that the effectiveness of the creosote is increased if pentachlorophenol is added to it.

4222. SNOKE, L. R. **Observations on a possible method of predicting soil-block bioassay thresholds by distillation characteristics of the weathered creosotes.** *J. For. Prod. Res. Soc.* 4 (2), 1954 (111–4). 9 refs.

A correlation was found between the amount of creosote boiling below 355° C. present after weathering for 60 days and the thresholds obtained in soil-block tests after a further 90 days' exposure to a fungus. [Cf. *For. Abstr.* 15 (No. 1948).]

4223. HÄGER, B. O. Sätt vid ytbehandling eller impregnering med trätjära. **[Method of surface treatment or impregnation with wood tar.]** *Swedish Patent* No. 131,820, May 29, 1951. pp. 2. [Sw.] P.O.

Wood is surface-treated or impregnated with wood tar polymerized by treatment at 200–325° C. and dissolved and/or suspended in an organic solvent.

4224. MCMULLEN, M. J. **The plant control method of determining the strength of boric acid treatment solutions.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 7 (2), 1953 (27–8).

Cf. *For. Abstr.* 15 (No. 1928).

4225. FARBER, E., and SCIASCIA, M. (to Timber Engineering Co.). **Wood treating process and composition.** *U.S. Patent* No. 2,655,454, Oct. 13, 1953. pp. 12. 5 refs. P.O.

The wood impregnating and dehydrating composition comprises tars and creosotes with a material consisting of one of the following: (1) ca. 5% by weight of water-miscible polyhydric alcohols having 2–6 hydroxyl groups; (2) ca. 2% by weight of solutions containing 10–40% by weight of an alkali metal borate in a polyhydric alcohol described in (1); (3) ca. 2% by weight of solutions containing 10–40% by weight of H_3BO_3 in a polyhydric alcohol referred to above; and (4) ca. 2% by weight of boric acid esters of the above alcohols, the material having a boiling point higher than 100° C.

4226. DEUTSCHE GOLD- UND SILBER SCHEIDEANSTALT. Produit pour la préservation du bois. **[Wood preservative.]** *French Patent* No. 1,032,503 July 2, 1953. pp. 3. [F.] P.O.

The preservative consists chiefly of $Zn(CNS)_2$ which, after impregnation, is transformed on the wood fibre into a sparingly soluble double salt, or of $Hg(CNS)_2$.

4227. GESELLSCHAFT FÜR HOLZIMPRÄGNIERUNG UND HOLZVERWERTUNG M.B.H. Holzimprägnierungsmittel und Verfahren zu seiner Herstellung. **[A wood preservative and a method for its manufacture.]** *Austrian Patent* No. 177,559, Feb. 10, 1954. pp. 1. [G.] P.O.

A mixture of $ZnCl_2$ (and other soluble metallic salts) with alkali chromates (and nitro compounds), preferably also with wetting agents, $ZnCl_2$ constituting 50–70% by weight of the total.

4228. ŠVALBE, K. P., and REĬNIKOV, I. JA. Fungisidnye svoĭstva nekotoryh soedineniĭ kadmija. **[Fungicidal properties of some Cd compounds.]** *Trud. Inst. lesohoz. Probl.* No. 6, 1953 (83–93). 7 refs. [Russ.russ.]

Wood-block tests showed $CdCl_2$, $Cd(NO_3)_2$, and even the insoluble $Cd_3(PO_4)_2$ to possess fungicidal properties exceeding those of $ZnCl_2$ and NaF, the toxic value being ca. 0·4 kg./cu.m.

4229. DAIMLER, K., and LORENZ, V. (to Farbwerke Hoechst). Holzschutzmittel. **[Wood preservatives.]** *German Patent* No. 864,743, Jan. 26, 1953. pp. 2. [G.] P.O.

Uses water-soluble salts of amido-sulphonic acid (in particular the crude NH_4 amido-sulphonate) as antifungal wood preservatives.

4230. DAIMLER, K., and LORENZ, V. (to Farbwerke Hoechst). Imprägnierpasten, insbesondere zur Mastennachpflege. **[Preservatives in paste form, in particular for the after-treatment of poles.]** *German Patent* No. 862,665, Jan. 12, 1953. pp. 2. [G.] P.O.

Water-soluble salts of the amido-sulphonic acid, with or without addition of fungicidal substances.

4231. ENGEL, H. (to Badische Anilin- & Soda-Fabrik). Holzkonservierungsmittel. **[Wood preservatives.]** *German Patent* No. 862,664, Jan. 12, 1953. pp. 2. [G.] P.O.

Uses condensation products of hydrocarbons and S, treated with nitrating agents.

4232. KLUCZYCKI, K. . Studia nad wartością grzybobójczą niektórych produktów oraz praktyczna metodyka jej badania. **[Studies on the fungicidal value of some products and a practical method of assessing it.]** *Acta Microbiologica Polonica, Warszawa* 1 (3), 1952 (223–56). 37 refs. [Pol.russ.e.] L.S.

It was found that different types of native and petroleum asphalt tested were not resistant to *Coniophora cerebella* and *Merulius lacrymans*; bituminous-tar pitch, on the other hand, remained almost fungus-free. To prevent decomposition of bituminous asphalts used for roofing felt etc., dinitrophenols or other fungicides must be added. The results of toxicity tests are given for 'Mikrosol' (commercial name of a mixture of salts of *o*-dinitrocresol) and several commercial products containing naphthene-sulphonic acids. The tests were made by a modified conventional method and the wood-block method. 'Mikrosol' was found to be easily leachable by water. A preparation 'X_5' consisting of α-sulphonates with an addition of nitrophenols was found to be a good preservative, with a low 'toxic value' (only 0·8–1·0 kg./cu.m.) and easily absorbed by wood.

4233. PÉCHINEY, COMPAGNIE DE PRODUITS CHIMIQUES ET ÉLECTROMÉTALLURGIQUES, and PROGIL. Procédé d'impregnation des bois. **[Method of impregnating wood.]** *French Patent* No. 1,036,652, Sept. 10, 1953. pp. 2. [F.] P.O.

Dry wood (e.g. poles) is impregnated in a closed vessel with aqueous alkaline solutions of chlorinated phenols (containing 2–5 Cl atoms) in tap water.

4234. ARNOLD, L. K., and WALKER, R. E. **Wood preservation.** *Bulletin, Iowa Engineering Experiment Station, Iowa State College* No. 174, 1953. pp. 92. 50 refs. P.R.

Laboratory hot-and-cold-bath treatment of Douglas-Fir pole sections under atmospheric pressure have shown that deeper penetration of 5% pentachlorophenol solution can be obtained in the coastal than the mountain type. Penetration and retention in both are unsatisfactory for any economically feasible treating time. Two modifications of the high-pressure treatments, viz. oil/water and pressure-reduction treatments, are shown in laboratory and commercial-scale experiments to give deeper penetration than the Lowry treatment. A theory is developed that air is trapped within the treated wood and that the degree of compression of this trapped air controls the volume and distribution of the injected oil.

4235. BROWN, F. L., and ZABEL, R. A. **Absorption and penetration of oil-soluble wood preservatives in dip treatments—a summary of progress.** *J. For. Prod. Res. Soc.* 4 (2), 1954 (101–3). [State College of Forestry, Syracuse 10, New York.]

The following preliminary results were obtained on 1700 specimens (0·50 × 0·75 × 6·0 in.) of *Pinus ponderosa* sapwood: (1) with oven-dry [o.d.] specimens, about ½ the total absorption obtained from a 10-min. dip occurred in the first 15 sec., while at 12 and 25% moisture content the greater part of the total absorption occurred during the same period. (2) The rate of absorption varied inversely with m.c. at the time of treatment. (3) An increase in sp. gr. effected a decrease in absorption, but the effect is questionable at 25% m.c. (4) Longitudinal penetration into o.d. wood was twice that into wood at 25% m.c.; penetration through radial and tangential surfaces did not appear to vary with m.c. or sp. gr. (5) More than ½ the total longitudinal penetration obtained during a 10-min. dip occurred in the first 15 sec. These results are not necessarily applicable to other species or to large boards and timbers.

4236. Campbell, L. H. **Bleeding temperatures of creosoted poles.** *Bell Laboratories Record, New York* 31 (9), 1953 (321–5). L.S.

Bleeding of creosoted poles was found to be closely related to their surface temperature. For the series of test-pieces examined, the onset of bleeding was at ca. 140–145° F. and severe bleeding occurred at ca. 160° F., irrespective of whether the irradiation source was the sun or the infra-red lamp and whether the test was done outdoors or indoors. In another series of tests, where bleeding temperatures were ca. 200–210°, wetting of the surface (imitating the natural sequence of hot sun/cool shower/hot sun) lowered them by ca. 35°.

4237. Mayfield, P. B. **The exudation of oil type preservatives from treated wood.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (52–5).

Discusses factors affecting exudation and possible methods of reducing it.

4238. **Methods of applying wood preservatives.** *Rep. U.S. For. Prod. Lab., Madison* No. *D*154, 1953. pp. 28. 19 refs. P.R.

Revised edition of No. *R*154 in the same series. [Cf. *For. Abstr.* 2 (310–1).]

4239. Koljo, B. Einfluss der Tränkverfahren auf die Tränkstoffaufnahme in der Holzimprägnierung. **[Effect of impregnation methods on the uptake of impregnant in wood impregnation.]** *Holz Roh- u. Werkstoff* 12 (1), 1954 (7–16). 17 refs. [G.g.] P.R.

Presents the results of tests on Pine (sap- and heartwood), Spruce, Birch and Oak (heartwood) impregnated with 1% $CuSO_4$ solution or creosote. The following methods were used: (1) pressure, (2) open-tank, (3) vacuum, and (4) Rüping. For H_2O the maximum uptake was obtained with (3) and (2), for creosote with (1) and for Birch and Pine sapwood, with the vacuum-pressure method. Different factors (time, pressure increase, temperature) have a relatively greater effect for species that are not easily impregnated than for those that are. For the former, full impregnation with aqueous solutions is best attained with (1) or the vacuum-pressure method; full impregnation of the latter with creosote can be attained by all methods.

4240. Herman, M. J. (to Koppers Co., Inc.). **Pressure process for impregnating wood.** *U.S. Patent* No. 2,668,779, Feb. 9, 1954. pp. 10 + 1 dgm. + 2 gphs. 8 refs. P.O.

Unseasoned wood is first dried by heating with steam, subjected to a vacuum and impregnated with a liquid. The wood (Pine with sp. gr. $< 0{\cdot}45$) and the impregnant are placed in a closed pressure vessel, the impregnant being continuously pumped into the vessel at a rate of 3–45 lb./cu. ft./hour.

4241. Boyd, J. D. **High pressure cylinder for preservation of timber.** *Repr.* from *Commonwealth Engineer* [*Melbourne*] 40 (12) [1952]; 41 (1) [1953]. pp. 12 + 2 tbls. 10 refs. (*Repr. For. Prod. Aust.* No. 195).

Describes with illustrations a cylinder used successfully in pilot tests for high-pressure impregnation with creosote.

4242. Gewecke, H. (to Atlasmaste Kommanditgesellschaft Dr.-Ing. H. Gewecke). Verfahren zur Imprägnierung von Holz mittels Vakuums und Drucks in geschlossenen Behältern. **[Method of impregnating wood by applying vacuum and pressure in closed vessels.]** *German Patent* No. 862,663, Jan. 12, 1953. pp. 2. [G.] P.O.

With the vacuum applied only to two limited areas (e.g. end faces of a pole) and the remaining surface of the timber in contact with the impregnating solution, the latter is subjected to a pressure of several atmospheres.

4243. Furusawa, K. **[Studies on the pressure treatment of Sugi (*Cryptomeria japonica*) with Na pentachlorophenol solution.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 67, 1954 (153–8). 3 refs. [Jap.jap.e.]

The following results were obtained: (1) high temperatures give better absorption and penetration than low temperatures; (2) penetration is greater at high than at low concentrations; (3) suitable pH values for the treating solution are 10·2–10·8; (4) the addition of wetting agents to the treating solution does not affect penetration; (5) there is some tangential, but little radial penetration; and (6) a clear solution gives better results than a turbid one. *From author's summary.*

4244. Edén, J. Stolpskydd med diffusions- eller osmosmetoden: svenska erfarenheter och planerade försök. **[Treatment of poles by diffusion or osmosis: Swedish experience and proposed research.]** *Era, Stockholm* 26 (8), 1953 (78–82). [Sw.] L.S.

Includes tabulated results of service tests on telegraph poles, established in 1938, and a discussion of costs.

4245. Neumark, S. **The preservative treatment of round *Eucalyptus camaldulensis* (*E. rostrata*) poles in Israel by a modified boucherie process: its laws and application.** *Ilanoth* No. 2, 1953 (47–99). 29 refs. [E.e.]

Telephone and telegraph poles are generally impregnated with $ZnCl_2$ by a modified Boucherie method resulting in a retention of ca. 1 lb./cu. ft. sapwood. The cost is ca. £I 3·25 /pole inclusive of labour, overheads etc. and treated poles have a service life of ca. 22 years.

4246. **[Preservative treatment of *Eucalyptus rostrata* poles.]** *Rep. Israel For. Dep. 1952/53*, 1953 (4–5).

It was found that a modified Boucherie treatment, by which a 5% solution of $ZnCl_2$ is injected with a pressure of 5 atm., gave effective protection from Eucalyptus borer (*Phoracantha semipunctata*) and Lyctus attack. A gang of 5 men can handle 200 poles a day.

4247. Walters, C. S., and Meek, W. L. **Report on Project 301-C. Preservative treatment of fence posts with toxic oil solutions by cold-soaking, dipping, and brushing.** *For. Note Ill. agric. Exp. Sta.* No. 44, 1954. pp. 4.

Cf. *For. Abstr.* 11 (No. 3088).

4248. Diehl. Lebensdauer von getränkten und ungetränkten Holzschwellen nach bayerischen Erfahrungen. **[Service life of impregnated and non-**

impregnated wooden sleepers in the light of Bavarian experience.] *Glasers Annalen, Berlin* 75 (5), 1951 (104–7). 1 ref. [G.] L.S.

Discusses the results of observations in Bavaria during the first 3 decades of this century on scores of thousands of railway sleepers. Replacement curves are given for a number of woods and preservatives. The average service life (l_m) always approximates to the period that sees ½ of the sleepers replaced (l_{50}). In the following, the first figure is l_m, the second l_{50}: Pine/$ZnCl_2$, 18·4, 18·4; Pine/($ZnCl_2$ + creosote), 22·0, 22·7; Pine/($ZnCl_2$ + tar oil), 20·1, 20·4; Pine/(Hasselmann-method impregnation), 18·5, 18·7; Beech/$ZnCl_2$ + creosote), 20·9, 22·6; Beech/($ZnCl_2$ + tar oil), 16·3, 15·0; Beech/($ZnCl_2$ + $HgCl_2$), 9·9, 9·8; Beech/$CuSO_4$, 10·8, 9·4; Oak untreated, 18·2, 18·4 years. Observations after World War I showed that, after 12 years, the following % of Pine sleepers was condemned: NaF, 21·6; $ZnCl_2$, 5·9, and Fluoxyl (NaF + 10% cresols), 1·3%.

4249. Wood, L. W., and Blew, J. O. **Engelmann Spruce and its preservative treatment for ties and mine timbers.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1944–3, 1953. pp. 4. P.R.

Picea engelmannii, when carefully treated with preservative, has a minimum service life of ca. 25 years as a railway sleeper. Untreated *P. engelmannii* may be used in mines where long life is not required; treated timber can be used for permanent installations.

4250. **[Use of Na trichlorphenate as a preservative.]** *Rep. Dir. For. Qd. 1952/53*, [1953?] (21).

Tomatoes packed in cases treated with Na trichlorphenate were reported to be seriously tainted. Investigation showed that at 0·5% concentration, which is the minimum for effective control of fungus, this preservative is a cause of taint. Na pentachlorphenate at 0·5%, on the other hand, does not appear to cause taint.

4251. Roistacher, C. N., and Baker, K. F. **Disinfesting action of wood preservatives on plant containers.** *Phytopathology* 44 (2), 1954 (65–9). 16 refs.

For one year after treatment by dipping in Cu naphthenate, nursery flats [shallow plant boxes] remained self-disinfecting and prevented the carry-over of damping-off fungi from a planting of infected soil to one of pasteurized soil. The naphthenate, however, caused injury to seedling roots. It can safely be used for flats or benches that are to be filled with soil and used for large plants, or in which seedlings are to be planted 2 or 3 in. from the sides. It can also be used for benches or shelves that are to carry potted plants. Flats commercially treated with Wolman salts or Erdalith are neither self-disinfecting nor injurious to roots.

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

See also Nos. 4054, 4161.

4252. Franklin, G. Procédé d'imprégnation d'un article en bois et article obtenu par ce procédé. **[Method of impregnating wooden objects.]** *Swiss Patent* No. 280,913, May 16, 1952. pp. 2. [F.] P.O.

The object is immersed in molten S until heated; the depth of penetration is 1·6 mm.

4253. Badische Anilin- & Soda-Fabrik. **A process for improving wood.** *Brit. Patent* No. 689,434, March 25, 1953. pp. 3. P.O.

Wood is impregnated with hardenable synthetic resins, viz. condensation products of polybasic urethanes and formaldehyde.

4254. Nishimoto, K., and Konishi, Y. **[Studies on impregnating woods. (II) Thiourea-formaldehyde resins.]** *Wood Res., Kyoto* No. 10, 1953 (22–32). 17 refs. [Jap.e.]

Resin absorption was highest for a 25% resin solution, and wood treated with 25% resin was most water-resistant and least subject to swelling. [The tables have English texts.] *From authors' summary.*

4255. Goto, T., and Kadita, S. **[Studies on impregnating woods. I. Treatment of woods with low condensation phenol resins: dimensional stability.]** *Wood Res. Kyoto* No. 11, 1953 (29–41). 9 refs. [Jap.jap.e.]

Results of shrinkage and swelling tests on Japanese Cypress [*Chamaecyparis obtusa*] treated with different resins are given in graphs and tables with English legends.

843. *Fireproofing and Fire Resistance*

4256. Rakos, J. J. **Fireproofing compositions.** *U.S. Patent* No. 2,593,400, April 22, 1952. pp. 4. 4 refs. P.O.

The composition contains 48% Na silicate, 20% Na_3PO_4, 20% lithopone, 10% finely divided quartz, 1% formaldehyde, and 1% NaOH (by weight).

4257. Robison, J. E. (to Fir-Tex Insulating Board Co.). **Fire retardant coating containing a carbohydrate, urea or melamine-formaldehyde and dicyandiamide or melamine.** *U.S. Patent* No. 2,648,641, Aug. 11, 1953. pp. 6. 5 refs. P.O.

The ingredients are applied in solution (aqueous or non-aqueous), their proportion being ca. 1 carbohydrate: 1 urea or melamine-formaldehyde: 2 dicyandiamide or melamine. The composition, when properly cured, is claimed to be washable, weatherproof, intumescent, and applicable to cloth, wood, metal etc.

4258. O'Brien, H. C. **Method of flameproofing cellulosic wallboard and article produced thereby.** *U.S. Patent* No. 2,648,615, Aug. 11, 1953. pp. 6. 8 refs. P.O.

The wallboard is immersed in a hot aqueous solution of ca. 7 parts (by weight) of water and ca. 1·75 parts each of borax and NH_4 sulphamate, the water added to the wallboard by this solution is substantially removed and the surface of the dried board coated with an organic sol of pyrobitumen, of particle size $< 0{\cdot}01\ \mu$ in diam.

844. *Attack by Plant Organisms*

See also No. 3982.

844.1. Sap-staining and Mould Fungi

See also No. 4054.

4259. Paclt, J. **On the pigment of *Chaetomium* sp., the cause of green stain of heart-wood in *Fagus sylvatica*.** *Experientia, Basle* 10 (1), 1954 (17). 5 refs. [E.g.] O.R.S.

The ether-extracted pigment was found to resemble flavoglaucin and the naturally oxidized pigment auroglaucin.

4260. **Penetrability studies [on Douglas Fir].** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1953*, 1954 (35–6).

Freshly felled Douglas-Fir saplings were cut into 4-ft. lengths and sprayed with a 3% solution of NaF in which *Trichoderma* spores were suspended, or with double-strength Dowicide G, or were left untreated. After several months, *Trichoderma* mould had developed profusely on all the poles save those sprayed with Dowicide G. Immersion in a petroleum oil showed that the oil penetrated $\frac{1}{4}$–$\frac{1}{2}$ in. into the mould-covered poles but only $\frac{1}{8}$ in. into the others. [Cf. *For. Abstr.* 15 (No. 835).]

844.2. Wood-destroying Fungi

See also Nos. 3617, 3658, 3676, 3725–38, 3853, 3875, 4097, 4114, 4228, 4232, 4299.

4261. Yokota, S. **[Diagnosis of wood-rotting fungi by red cabbage extract.]** *J. Jap. For. Soc.* 36 (3), 1954 (72–5). 10 refs. [Jap.jap.e.]

A new method of classifying wood-rotting fungi from their chemical reactions with a red-cabbage medium [see *For. Abstr.* 15 (No. 837)] was tested on 24 brown- and white-rot fungi. It was clear that the change in colour of the extract from purple to yellow with the white-rot fungi coincided with the existence of laccase, and that from purple to red with the brown-rot fungi was related to the strong acidity of the media on which they developed vigorously. [Results are given in tables with English legends.] *From author's summary.*

4262. **Methods of testing fungal resistance of manufactured building materials.** *Brit. Stand.* No. 1982, 1953. pp. 9. Price 2*s*. P.R.

4263. Aoshima, K. **[Decay of Beech wood by the haploid and diploid mycelia of *Elfvingia applanata* (Pers.) Karst. (*Fomes applanatus*).]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 68, 1954 (181–202). 11 refs. [Jap.E.jap.e.] Also in *Phytopathology* 44 (5), 1954 (260–5).

Considerable variations in wood-rotting ability were found among individuals. Differences in wood-rotting ability between haploid and diploid mycelia were not clear, but the range in variations was greater among haploid mycelia.

4264. Nagatomo, I., and Akai, S. **[Studies on wood decay. VII. The relative resistance of sapwood of Black Pine (*Pinus thunbergii*) to decay.]** *J. Jap. For. Soc.* 35 (1), 1953 (19–21). 8 refs. [Jap. jap.e.]

Tests were made on 5 white-rot and 4 brown-rot fungi. There was vigorous mycelial growth of *Fomes pomaceus*, *Polystictus sanguineus* and *Lenzites betulina* on wood blocks, but only poor growth of *Schizophyllum commune* which had grown strongly on malt agar. In flask cultures, decay by *F. pomaceus* was greatest (27·8% decrease in dry weight of test blocks) and that by *S. commune* least (1·1%). *F. pinicola* and *L. subferruginea* also caused serious decay. [Cf. *For. Abstr.* 14 (No. 2818).] *From authors' summary.*

4265. Enkvist, T., Solin, E., and Maunula, U. **Studies on Pine wood decayed by brown rot.** *Pap. ja Puu* 36 (3), 1954 (65–8, 86). 27 refs. [E.e.] P.R.

Gives results of chemical analyses and of sulphite digestion.

4266. Richards, D. B. **Physical changes in decaying wood.** *J. For.* 52 (4), 1954 (260–5). 15 refs.

Small beams of Red Gum [*Liquidambar styraciflua*] and Loblolly Pine were subjected to decay by white- and brown-rot organisms for various periods up to 14 weeks. Physical properties of the decayed wood, including volume, moisture content, % weight-loss, and toughness were studied for different periods. Of the four fungi used, only *Poria monticola* reduced the wet volume of the wood significantly. The other brown-rot fungus, *Lenzites trabea*, caused some shrinkage of the wood upon drying but none could be detected while the test pieces were still wet. Toughness was a more sensitive measure of early decay than % weight-loss. When plotted against % weight-loss, the toughness curve was generally hyperbolic in form. There was no consistent difference between the white-rot and brown-rot organisms in their effects on toughness. The moisture content was affected by decay. In general, it increased with advancing decay, but the rate at which it increased was different for the different fungi. *From author's summary.*

4267. Cartwright, J. B., Edwards, D. W., and McMullen, M. J. **Project No. F.P. 2–18. Progress report No. 1. Methyl bromide as a gaseous inhibitor for wood-invading fungi.** Division of Wood Technology, New South Wales Forestry Commission, Sydney. 1953. pp. 5 + 1 photo. 3 refs. P.R.

Tests on *Pinus sylvestris* blocks show that fumigation with MeBr may prove an effective and readily applicable method for large-scale sterilization of shipments of sawn timber.

4268. Higuchi, T., Watanabe, M., and Tamura, H. **Studies on the effect of sodium pentachlorophenate on the metabolism of some wood-rotting fungi.** *J. Jap. For. Soc.* 35 (1), 1953 (1–8). 7 refs. [E.e.jap.]

Studies were made (for 16 fungi) of the effect of Na pentachlorophenate on uptake of O.

4269. Hartley, C. **Protecting green lumber from decay during shipment.** *For. Path. spec. Release U.S. Bur. Pl. Ind.* No. 26 (rev.) 1953. pp. 3. 3 refs. Cf. *For. Abstr.* 7 (No. 1923).

845. *Attack by Animals*

See also No. 3982.

845.1. Marine Borers

See No. 4164.

845.2. Terrestrial Borers

See also Nos. 3617, 4162, 4246.

4270. Guillaume, A. Le capricorne des maisons et ses dégâts. [***Hylotrupes bajulus* and damage done by it.**] *Chim. et Industr.* 71 (3), 1954 (507–10). [F.] D.S.I.R.

Stresses the danger to buildings caused by this pest, and briefly discusses methods of prevention by means of insecticides, and physical or chemical control methods.

4271. Fisher, R. C. **A longhorn beetle new to Britain.** *Timber Technol.* 62 (2176), 1954 (75). 1 ref. P.R.

Stresses the similarity in type of damage between the native longhorn beetle *Phymatodes testaceus*, and the Indian longhorn beetle *Trinophylum cribratum*, which has been reported in British timberyards. [Cf. *For. Abstr.* 9 (No. 2281).]

4272. Simeone, J. B. **Carpenter ants and their control.** *Bull. N.Y. St. Coll. For.* No. 34, 1954. pp. 19. 13 refs.

Deals with the control of *Camponotus pennsylvanicus* in buildings, poles and posts, stored lumber, living trees, and fuelwood.

4273. Menon, K. D. **Test of five insecticides against ambrosia beetle attack.** *Malay. Forester* 17 (1), 1954 (11–4).

Five proprietary brands of insecticide [not named] were tested on *Shorea leprosula* logs. Insecticides A and B (both containing γBHC) gave some, though insufficient protection. The other 3 (E, containing γBHC; C and D, containing chlorinated carbons) were either ineffective or positively attractive. A and B were applied in water; C, D, and E in kerosene.

4274. Francke-Grosmann, H. Tierische Holzschädlinge. Holzwespen (*Siricidae*). [**Animal pests of wood: Siricidae.**] *Holz Roh- u. Werkstoff* 12 (1), 1954 (35–8). 10 refs. PR..

4275. Snyder, T. E. **Unusual insect damage.** *Pest Control* 22 (1), 1954 (27–8). D.S.I.R.

Presents photos showing: (1) damage to lumber by *Dermestes vulpinus*; (2) woodwork eaten by winged psocids, and (3) wood submerged in water, eroded by young 'caddice flies'.

847. *Drying* (*Seasoning*)

See also Nos. 4154, 4181, 4302–4.

4276. Archihovskaja, N. V. Issledovanie peredviženija vlagi v drevesine v processe vysyhanija. [**Research on the movement of moisture in wood during drying.**] *Trud. Inst. Les.* 9, 1953 (158–85). 17 refs. [Russ.russ.]

The effects of air humidity, temperature, place in the stem, and grain direction on the time of drying are taken into account in the suggested new method for measuring the duration of the drying process in wood. The time of drying depends curvilinearly on air humidity: up to a certain humidity this time slowly increases, while a further rise of humidity causes considerable slowing-down of the drying process. The time of drying at 40° is ca. thrice that at 80° C. The relative drying rate has been determined for sapwood and heartwood in both radial and tangential directions. Curves of the drying rate for Pine have been drawn and show smooth inflexions. An interpolation method has been suggested for the determination of moisture distribution from the average m.c., based on ratios between the max., min., and average m.c. The m.c. at a depth of $\frac{1}{6}$ of specimen thickness is equal to the average m.c.

4277. Peck, E. C. **The air drying of Engelmann Spruce.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1944–5, 1953. pp. 11 + 6 photos + 6 dgms. + 1 gph. 5 refs. P.R.

Discusses air-drying techniques most suitable for Engelmann Spruce boards and dimension stock in the Northern Rocky Mountain area.

4278. Graham, R. D. **Seasoning and preservative treatment of Tanoak.** *J. For. Prod. Res. Soc.* 4 (2), 1954 (92–5).

Sleepers of *Lithocarpus densiflorus* dried in 13 months from an initial moisture content of 100% on an oven-dry basis to less than 30% without excessive checking. They should not be left to season for more than one winter because of the low durability of the sapwood. Incising, end-coating or covering the sleepers had little or no effect on rate of drying or the character of the final checking. Sapwood of air-seasoned sleepers was readily penetrated by oil-type preservatives using low pressure and short pressure periods, but heartwood was resistant. Incising was not necessary for treating the sapwood and did not obviously improve heartwood penetration, but it appears to be a desirable practice for material containing heartwood.

4279. Mathewson, J. S. **Air seasoning of lumber at small mills.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*899–8, 1953. pp. 5 + 5 photos. P.R.

Describes and discusses the following methods of piling: flat piling, end piling, end racking, and crib piling.

4280. Torgeson, O. W. **Seasoning dimension stock.** *Rep. U.S. Prod. Lab., Madison* No. *R*1242 (rev.) 1953. pp. 10 + 1 dgm. + 5 gphs. 1 ref. P.R.

Discusses the piling for air and kiln drying, end coating, kiln schedules, and different kinds of warp (bow, crook, cup, twist, and diamond), for Beech, Birch, and Maple dimension stock, the warp being illustrated by graphs.

4281. Melan, H. Energieprobleme der neueren Holztrocknungsverfahren. [**Energy problems in recent wood seasoning processes.**] *Mitt. öst. Ges. Holzforsch.* 6 (1), 1954 (5–7). [G.] P.R.

4282. Andersson, R. **Heat economy in timber drying.** *Transl. For. Prod. Lab., Can.* No. 62, 1953. pp. 26. 22 refs. Transl. by E. Perem from *Pap. ja Puu* 34 (9), 1952 (319–32). [See *For. Abstr.* 14 (No. 1685).] Limited distribution. P.R.

4283. Kröll, K. **Movement of the moisture in softwood when dried at temperatures around 100°.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1818, 1953. pp. 36 + 4 dgms. + 11 gphs. 32 refs. Transl. by H. E. Kijlstra from *Holz Roh- u. Werkstoff* 9 (5–6), 1951 (176–81; 216–24). [See *For. Abstr.* 13 (No. 3442)]. Limited distribution.

4284. **Kiln-drying lumber cut from young-growth Douglas Fir.** *Rep. Pacif. Nthwest. For. Range Exp. Sta. 1953*, 1954 (54–5).

Preliminary results of a study indicate that sound-knotted timber from young-growth Douglas Fir can be kiln-dried to a moisture content of 12% and then satisfactorily surfaced without serious degrade. High-humidity kiln schedules are required.

4285. Ellwood, E. L., and Kauman, W. G. **Project S.7–12. Vapour drying. Progress report No. 3. Project P. 10–3. Pressure treatment of sleepers. Progress report No. 5. The vapour drying and preservation of Australian grown *Pinus radiata* railway sleepers. [First report.]** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 12 + 4 photos + 2 dgms. + 3 gphs. + 2 tbls. 1 ref. Limited distribution. P.R.

The actual drying time necessary to ensure satisfactory creosote pressure treatment was ca. 5 hours for green sleepers using 'mineral turpentine' as the drying agent. Satisfactory creosoting was achieved by the Rueping process.

4286. Kauman, W. G. **Project S. 7–12. Vapour drying. Progress report No. 5. Experiment S. 7–12/3. The vapour drying of air dried 'Ash' Eucalyptus and Myrtle Beech.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 11 + 3 photos. 3 refs. Limited distribution. P.R.

It was found that 1-in. *Eucalyptus regnans* may be vapour-dried over the moisture-content range 26–12% in some 5 hours at 200–240° F. with little degrade. The vapour used was perchlorethylene at atmospheric pressure. *Nothofagus cunninghamii* also gave encouraging results, but not *E. gigantea*.

4287. Kauman, W. G. **Project S. 7–12. Vapour drying. Progress report No. 6. Experiment S. 7–12/5. Tests on the influence of working pressure on drying rate and drying quality in vapour drying (First report).** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 18 + 3 photos + 2 gphs. + 3 tbls. 9 refs. Limited distribution. P.R.

Comparative drying tests on *Eucalyptus regnans* at 230–240° F. (pressure ca. 5 in.) and at atmospheric pressure showed that, although the drying rate was slightly faster and collapse possibly slightly less under vacuum, no difference in drying quality was detectable.

4288. Kegel, K. **Possibilities of dielectric high-frequency drying in the timber and paper industry.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1476, [*n.d.*]. pp. 7. Transl. by M. Slade from *Papier, Darmstadt* 4 (21/22), 1950 (405–10). Limited distribution. P.R.

4289. Yamamoto, T. **On the determination of moisture content of wood during high-frequency drying.** *Trans. 61st Mtg. Jap. For. Soc.* 1952 (200–1). [Jap.?] From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 3, 1952/53 (1954), (90–1). [E.]

Moisture content is calculated, without taking samples from the wood, from the following formula:

$$\frac{M}{100} = \frac{3600\,\eta W}{4{\cdot}2\,g\theta} - 0{\cdot}327,$$

where W = total input of power from the H.F. generator in KWH, g = weight of wood being dried in kg., θ = increase in temperature of the wood in ° C. and η = the efficiency of the H.F. generator. The method is based on the heat capacity of wood and water and is not influenced by differences in species or sp. gr.

4290. Kadita, S., Kato, N., and Takagi, T. **[Studies on heating and drying wood by infra-red rays.]** *Wood Res., Kyoto* No. 9, 1952 (68–79). [Jap.jap.e.]

Conventional heat-ray lamps and a new heating apparatus designed at the Wood Research Institute, Kyoto University, were compared. The new apparatus [illustrated] consists of a long metal tube heated by inserted nichrome wire and a parabolic reflecting mirror. The operating temperature is about 600° C. and the radiation wavelength longer than that of an infra-red lamp. Results of tests on heating and drying Beech veneer about 0·5 mm. thick show that the temperature increase and rate of drying are greater for the new heaters, presumably because of the higher absorption coefficient for longer-wavelength radiation. [Results are shown in graphs and tables with English legends.] *From authors' summary.*

4291. Suga, K. Verfahren zur Holzbehandlung. **[Method of treating wood.]** *German Patent* No. 855,328, Nov. 13, 1952. pp. 3. [G.] P.O.

Wood is dehydrated either by heating while it is being softened ih a volatile liquid ($C_2H_2Cl_4$, C_2HCl_5) with a boiling point above 100° C., or by softening it in a previously heated volatile liquid.

4292. Chudnoff, M. **The effects of zinc chloride on some shrinkage properties of *Eucalyptus camaldulensis* wood.** *Ilanoth* No. 2, 1953 (1–16). 5 refs. [E.]

Experiments carried out at Ilanoth on seasoning *Eucalyptus rostrata* poles, using a dilute solution (5%) of $ZnCl_2$, showed that treated poles did not check or split as severely as untreated ones. Further experiments carried out on 2·5 × 7·5 × 2·5-cm. specimens from a freshly felled tree showed that impregnation by soaking in a 5% solution of $ZnCl_2$ has a three-fold effect: (1) there is a considerable reduction in % of collapse; (2) there is a noticeable reduction in true shrinkage; and (3) the treated wood, when air-dried, has a higher equilibrium moisture content than non-treated wood. A non-treated tangentially cut board of *E. rostrata* sapwood having a width of 20 cm. in the green condition will collapse and shrink to a width of 15·5 cm. when air-dried to 20% m.c.; but if impregnated with a 5% solution of acidified $ZnCl_2$, its air-dried width will be rather over 19 cm. Treated poles can be dried with a minimum of collapse and little or no surface checking.

848. *Timberyard Practice. Handling and Storage of Timber*

See also No. 3619.

4293. Benoit, J. **Fresh water storage of hardwood logs.** *Wood* 19 (3), 1954 (116–9). Transl. from *Bois For. Trop.* No. 31, 1953 (42–9). [See *For. Abstr.* 15 (No. 2015).]

85. GRADING OF WOOD AND WOOD PRODUCTS

851. *Timber Quality in General*

4294. **Quality of locally-grown Teak.** *Malay. Forester* 17 (1), 1954 (29–30).

Notes on physical and mechanical properties of wood from one 30-year-old tree grown in Johore. They compared favourably with those for Teak from Burma and Malabar.

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 3658, 3679, 3853, 4143–4, 4167–9, 4185, 4236–7.

4295. Harrar, E. S. **Defects in hardwood veneer logs: their frequency and importance.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 39, 1954. pp. 45.

Describes and gives photographs illustrating 26 indicators of defect, visible either on the circumference or on the ends of logs, and tabulates figures showing their frequency in some 5000 blocks of *Liquidambar styraciflua, Liriodendron tulipifera, Nyssa sylvatica* and *N. aquatica.*

4296. Rao, H. S. **The phenomenon of twisted trees.** *Indian For.* 80 (3), 1954 (165–70). 38 refs.

Reviews the literature on spiral growth in trees, lists Indian species in which it has been observed, and gives a note of observations on nearly 500 trees of *Cedrela toona* of varying age and provenance in which the proportions of straight-grained, left-handed twist and right-handed twist were consistently about 70 : 15 : 15.

4297. **A simple device for detecting compression wood.** *Rep. U.S. For. Prod. Lab., Madison* No. 1390 (rev.) 1953. pp. 2 + 2 photos + 3 dgms. 2 refs. P.R.

Based on Pillow's method. [Cf. *For. Abstr.* 3 (p. 139).]

4298. Paclt, J. Über die Entstehung der Mondringigkeit der Eiche. **[The origin of included sapwood in Oak.]** *Phytopath. Z.* 21 (2), 1953 (210–3). 7 refs. [G.] O.R.S.

Discusses the variations in heartwood amounts (e.g. in the broad and narrow heartwoods of *Q. cerris* in Czechoslovakia) and the cause—most probably frost damage—of light-coloured rings, like sapwood, in the heartwood.

4299. Paclt, J. Odlupčivost' topol'ov a jej pôvodca. **[Ring-shakes in Poplars and their cause.]** *Pol'ana* 9 (11), 1953 (255–6). [Slovak.]

In addition to *Trichothecium roseum*, preliminary studies have isolated a so far unidentified parasite *Deuteromyces* (*Sphaeropsidales*?).

4300. Amos, G. L. **Radial fissures in the early wood of conifers.** *Repr.* from *Aust. J. Bot.* 2 (1), 1954 (22–34 + 2 plates). (*Repr. For. Prod. Aust.* No. 198.)

The anatomy of such defects in young trees of White Spruce (*Picea glauca*), Douglas Fir and Radiata Pine shows plainly that fissuring is the result of partial collapse and radial cleavage of the early-wood tracheids during the formation of late-wood. After cleavage, the 3 species react differently. In White Spruce the cavity remains empty; in Douglas Fir it fills with resin, whereas in Radiata Pine there is proliferation of cellular tissue. The different responses are due to the different anatomy and physiology of the ray parenchyma cells. After cleavage the living ray cells are exposed to a sterile cavity containing heavily saturated air, which acts as a powerful growth stimulus. In Radiata Pine, ray parenchyma cells have primary walls only, and the response is a proliferation of these cells. In Douglas Fir and White Spruce, the ray parenchyma has secondary thickening and small ray tracheid pitting, precluding growth. The response is an increased metabolic rate, producing resin in Douglas Fir (heartwood-forming species) and without solid end-products in White Spruce (species with little contrast between sapwood and heartwood).

4301. Skjelmerud, H., and Hvamb, G. Registrering av skurnøyaktighet. **[Registering sawing accuracy.]** *Norsk Skogind.* 8 (2), 1954 (49–53). [Nor.e.] P.R.

Describes with illustrations a 2-pronged instrument with an electric strain gauge on each prong which registers variations in plank breadth. It has been successfully used in industrial conditions.

4302. **The detection and relief of case-hardening.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 213 (rev.) 1952. pp. 5. P.R.

4303. Baker, G. **The effect of log storage time on development of brown stain in Northern White Pine [during kiln seasoning].** *Tech. Note Univ. Me. For. Dep.* No. 8, 1951. pp. 1.

No stain developed in wood sawn and seasoned within 24 hr. of felling, but logs piled on skids in the woods for 42 days and for 93 days both developed a considerable amount of brown stain, the depth of penetration increasing with increased storage time.

4304. Anderson, B. G., and Frashour, R. G. **Sticker stain in one-inch Red Alder lumber.** *Rep. Ore. For. Prod. Lab.* No. *D*–3, 1954. pp. 6 + 13 gphs. Also in *J. For. Prod. Res. Soc.* 4 (3), 1954 (132–5).

Experiments showed that stain developing at sticker crossings in air-drying 1-in. *Alnus rubra* could be prevented by steaming the stickered lumber beforehand, and that this treatment also gave a desirable and uniform colour in the timber after final drying. Optimum treatment appeared to be 140° F. dry-bulb temperature and 4° F. wet-bulb depression and a minimum steaming time of ca. 18 hr. This method allows full advantage to be taken of air-drying during the summer without loss caused by stain or undesirable colour, and a reduction of 2–4 days in total kilning time.

853. *Grading of Wood in the Rough*

See also No. 4177.

4305. **Interim log grades for Southern Pine (based on unit value of yard lumber outturn): development, analysis, quality indices.** Southern Forest Experiment Station [, New Orleans]. 1953. pp. 18.

The four log grades are based on log diameter, number of overgrown knots and sum of diameter of sound and unsound knots. Logs are further degraded for excessive sweep, the presence of massed heart-rot hyphae on the log surface, and for wide dispersal of 'bad' knots (knots so large that log diameter is less than 6 times knot diameter) and any unsound knots.

4306. **Proceedings of a symposium on a standard hardwood quality index.** Purdue Agricultural Experiment Station, Lafayette, Indiana. [1953]. pp. 85.

As a result of discussion it was agreed that the quality index [cf. *For. Abstr.* 15 (No. 1675)] of a log or tree should be calculated on the basis of: (1) No. 1 common timber grade, (2) one-in. thickness and (3) average timber prices for the period 1947–51. The following papers are included: The quality index concept (*A. M. Herrick*); The use of quality indexes in designing log grades (*O. P. Wallace*); The advantages of quality indexes in tree grading (*R. A. Campbell*); How the quality index can help in marking timber (*M. Martinelli, Jr.*); Quality index in evaluating sawmilling efficiency (*D. A. Kulp*); Historical and statistical stability in price ratios (*W. H. Cummings*); Lumber thickness and its effect on value and quality index (*C. L. Vaughn*); and A basis for hardwood log quality indexes (*P. R. Kramer*).

854. *Grading of Converted Timber*

See also Nos. 3980, 4060.

4307. Davis, E. M. **Some principles in lumber grading.** *Rep. U.S. For. Prod. Lab., Madison* No. 1963, 1953. pp. 8. P.R.

Contains diagrams with legends and explanatory text, relating to: current uses of wood; maximum knots in different widths of No. 1 Douglas Fir boards; maximum knots in 8-in. Douglas Fir boards; quality distribution in Ponderosa Pine; softwood shop grades; maximum defects in Southern Pine, and principal lumber grades.

4308. Čajánek, K. Československá štátna norma pre druhovanie dreva. **[The Czechoslovak national standards for timber grading.]** *Pol'ana* 9 (11), 1953, (260–1). [Slovak.]

86. PULP INDUSTRIES. COMPOSITE MATERIALS MADE WHOLLY OR PARTLY OF WOODY MATTER. CHEMICAL UTILIZATION OF WOOD

See also section 813 and No. 4395.

4309. **Sixth meeting of the FAO Technical Panel on Wood Chemistry, Stockholm 1953.** FAO, Rome. No. *FAO* 54/2/767, 1954. pp. vi + 169. Many refs.

Apart from a paper on wood resins (*E. Ott*), and two on pulping developments, the remaining 14 papers deal with the saccharification of wood. Recent work on wood hydrolysis in the U.S.A. is reviewed by *J. A. Hall*; other papers are: The Hereng process and the hydrolysis of tropical woods (*J. Savard*); The Scholler-Tornesch process (*H. Rockstroh*); War-time investigations on wood saccharification in Italy (*G. Centola*); two papers (*E. Hägglund*, and *K. Schoenemann*) on the Rheinau processes; and others dealing with yeast-growing, fodder cellulose, sulphite liquor, and polyhydric alcohol from wood.

861. *Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives*

See also Nos. 3962, 3968–71, 4080, 4102, 4265, 4309.

4310. **List of publications on pulp and paper.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*444, 1953. pp. 41. P.R.

4311. Giertz, H. W. **The physical structure and chemical composition of wood cellulose fibres, with special attention to papermaking properties.** *Medd. svenska TräforsknInst.* (*Träkem. PappTekn.*) No. 123, 1953. pp. 26. 13 refs. [E.e.] (*Repr.* from *Proceedings of the Technical Section of the British Paper and Board Makers' Association* (*incorporated*) [*London*] 33 (3), 1952 (487–512).) P.R.

4312. Seabra, L. de. Acerca do interesse papeleiro de duas espêcies dos Açores (*Hedychium gardnerianum* e *Cryptomeria japonica*). **[Pulping possibilities of two species from the Azores (*H. gardnerianum* and *C. japonica*).]** *Estud. Inform. Serv. flor. aqüic. Portugal* 18–D3, 1953. pp. 31 + 4 dgms. + 2 plates. 6 refs. [Port.f.] Limited distribution.

Results are presented of tests in pulping these 2 species for wrapping paper. The best results with *C. japonica* were obtained by the sulphate process, but tearing strength was inferior to that of kraft pulp from Maritime Pine. With *H. gardnerianum* the sulphite process gave the best results.

4313. Bhat, R. V., and Gupta, P. R. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part XVIII. Chemical pulps for writing and printing papers from *Sterculia alata* Roxb. (Letkok).** *Indian For.* 80 (3), 1954 (154–9). 3 refs.

Yields were low, bleaching requirements high, and bleachability poor. Average fibre length was 1·19 mm. It is concluded that the use of this species as pulpwood is uneconomic.

4314. Bhat, R. V., and Virmani, K. C. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part XIX. Writing and printing papers from sugarcane [*Saccharum officinarum*] bagasse.** *Indian For.* 80 (4), 1954 (216–36 + 8 sample sheets). 9 refs.

4315. Bhat, R. V., and Karnik, M. G. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part XX. Chemical pulps from *Eupatorium odoratum* Linn. (Assam-Lota.)** *Indian For.* 80 (5), 1954 (277–84). 2 refs.

The wood of this shrub was found to be short-fibred and to require an excessively high quantity of chemicals for digestion and for bleaching.

4316. SCHAFER, E. R. **Engelmann Spruce for pulp and paper products.** *Rep. U.S. For. Prod. Lab. Madison* No. *R*1944–2, 1953. pp. 6. P.R.

Tabulates: (1) the physical characteristics and chemical analysis of *Picea engelmannii* used in pulping experiments, (2) typical yields obtained in pulping (sulphate, sulphite, and groundwood), and (3) properties of experimental newsprint paper obtained.

4317. VENET, J. Fabrication de pâtes à papiers à base de bois feuillus. **[The manufacture of pulp from hardwoods.]** *Rev. for. franç.* 6 (5), 1954 (297–310). [F.]

An account of amounts of hardwoods used and methods employed in the American pulp industry, with a discussion of the possibility of similar developments in France.

4318. SPROULL, R. C. **Newsprint from [southern] culled hardwoods.** *J. For. Prod. Res. Soc.* 4 (2), 1954 (89–91). 11 refs.

Literature on pulping hardwoods is reviewed. Groundwood pulps were made from freshly felled *Nyssa sylvatica* and from a mixture of Red and White Oak stored for some months. The Oak pulp used in blends with that from *N. sylvatica* and bleached kraft pulp gave newsprint with good physical and printing properties.

4319. KOEPPEN, A. von, and COHEN, W. E. **Sub-project PP.17–1. The pulping properties of New Guinea timbers. Progress report No. 1. A preliminary investigation of four Mangrove species and Klinki Pine.** Division of Forest Products, C.S.I.R.O., South Melbourne. 1953. pp. 28 + 5 photos + 1 tbl. 28 refs. Limited distribution.

Cf. *For. Abstr.* 15 (No. 904).

4320. KITAO, K. **[Chemical composition of ray cells in hardwood pulps.]** *Wood Res., Kyoto* No. 11, 1953 (21–8). 9 refs. [Jap.e.]

Betula tauschii and *Mallotus japonicus* were pulped by the sulphite and kraft processes. Ray cells of *M. japonicus* screened from the pulp showed only small differences in chemical composition from the wood fibres. Birch ray cells from sulphite pulp contained a large amount of lignin and benzene-soluble material, and those from kraft pulp about the same amount of benzene-soluble material. Wood fibres of both woods were similar in chemical composition but those of Birch contained more pentosan and had higher pentosan content and viscosity. The ray-cell cellulose of Birch had a low polymerization degree while that of *M. japonicus* had a polymerization degree similar to that of its wood-fibre cellulose. Its ray cells were larger and more frequent (15% as against 2–3% of the pulp) than those of Birch. [Results are given in tables with English legends.] *From author's summary.*

4321. SCHAFER, E. R., and HYTTINEN, A. **Groundwood pulping of Ponderosa Pine thinnings.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1947, 1953. pp. 4 + 2 tbls. P.R.

The pulps obtained were equal in strength to and brighter than a number of commercial newsprint-grade pulps. Good-quality book and newsprint papers can be made with Ponderosa Pine groundwood in their furnishes.

4322. DORLAND, R. M., LEASK, R. A., and MCKINNEY, J. W. **Neutral sulphite cooking of hardwoods.** *Pulp Paper Mag. Can.* 55 (3), 1954 (258–62). 9 refs.

Discusses the results of pulping Aspen and mixed hardwoods by the neutral sulphite semi-chemical method.

4323. PANCIROLLI, F., and CERAGIOLI, G. Preparazione di cellulose semichimiche dall' *Eucalyptus saligna.* **[Preparing semi-chemical pulps from *Eucalyptus saligna*.]** *Cellulosa e Carta, Roma* 5 (3), 1954 (8–21). 22 refs. [It.f.e.]

In neutral sulphite cooks with an 80% yield it is possible to obtain semi-chemical pulps with a brightness of 35–37%. Stronger pulps can be got with 70–72% yield but brightness lower than 28%. Acid sulphite pulps are brighter but less strong. Bleached semichemical pulps from *E. saligna* are not inferior to similar Poplar pulps and are superior to Beech and equal to good kraft pulps.

4324. BLAND, D. E., and BATTERHAM, A. **Delignification of the wood of *Eucalyptus regnans* F. Muell. by sodium hydroxide and by sodium sulphide.** *Aust. J. appl. Sci.* 5 (1), 1954 (41–50). 13 refs. P.R.

The progress of delignification of the wood of *Eucalyptus regnans* with 0·5 *N* NaOH and with 0·5 *N* Na_2S has been followed at 130, 150, and 170°C. The effect of concentration of each of the agents on the progress of delignification at 150° has also been investigated. NaOH acted about twice as fast at 150 as at 130° and about twice as fast at 170 as at 150°. The sulphide acted more rapidly than NaOH but the effect of temperature on its action was not as great, although increase in concentration accelerated the action of the sulphide more than that of NaOH. With either agent substantially the same pulp could be prepared under a variety of cooking conditions. Na_2S removed lignin slightly more selectively than did NaOH. Experiments with sawn 'chips' of different shapes showed that grain direction had no effect on the removal of lignin by NaOH but that under the conditions of this experiment there was some preferential removal by the sulphide in the longitudinal direction. *Authors' summary.*

4325. MILLER, H. (to Watervliet Paper Co.). **Alkaline pulping of preimpregnated deciduous wood.** *U.S. Patent* No. 2,599,572, June 10, 1952. pp. 6. 14 refs. P.O.

Chips of hardwood species are impregnated with ca. 5% NaOH solution at ca. 222° F. for ca. 90 min.; the excess NaOH is then removed, and the chips are cooked in an aqueous suspension of $Ca(OH)_2$ for ca. 7 hours at ca. 280° F.

4326. BROWN, K. J., and MCGOVERN, J. N. **High-yield cold soda pulps and products from several woods.** *Repr.* from *Paper Industry, Mount Morris, Ill.* 35 (1), 1953 (66–9). P.R.

Pulp yields of 88–90% are obtained from White Oak, Sweet Gum, Red Oak, Aspen, Red Alder, and Cottonwood by the cold soda process. These pulps can be bleached economically to brightness values of 65–70%.

4327. KARLSTRÖM, K. J. (to Wikmanshytte Bruks Aktiebolag.) Verfahren zum Vorbehandeln von Holz mit Dampf für den Sulfitaufschluss bei der Zellstoffgewinnung. **[Method of pretreating wood with steam for sulphite digestion.]** *German Patent* No. 863,449, Jan. 19, 1953. pp. 2. [G.] P.O.

Barked or unbarked wood is treated for 12–16 hours with steam at 80–100° C.

4328. ŽEREBOV, L. P. Razloženie drevesiny eli v processe suljfitnoĭ varki. **[Decomposition of Spruce in sulphite cooking.]** *Bumažnaja Promyšlennostj, Moskva* 28 (5; 9; 11), 1953 (8–13; 6–14; 5–9). 15 refs. [Russ.] L.S.

Presents in tables and graphs the results of research on the sulphite digestion of Spruce (and Pine), the cooking process being considered in the light of modern ideas on wood structure. The main conclusions are: (1) Spruce and Pine wood inside the cambial layer are not homogeneous, but present two widely differing, and only loosely bound, complexes: the cellulose/carbohydrate (*a*), containing the entire cellular lattice and consisting of cellulose combined strongly with other carbohydrates, and the ligno/carbohydrate (*b*), consisting as to more than ½ of lignin combined with other carbohydrates and pectin which, in turn, is chemically bound with the primary wall; (2) (*a*) is chemically the most stable part of the wood, whereas (*b*) begins to hydrolyse at relatively low temperatures, i.e. the layer of the middle lamella hydrolyses along the middle line even below 120° C., the pectin film of the cells hydrolysing at a higher temperature; (3) both (*a*) and (*b*) vary in composition, (*a*) differing widely for early and late wood; (4) uronic acid and 'cellulose pentosans' become more and more important in the process of pulping, since the OCH_3 groups continue to separate up to the end of cooking, i.e. up to the final decomposition of the wood residue.

4329. HATA, K. **[Studies on the pulp of Akamatsu (*Pinus densiflora*) wood. (XXI). The phenolic substances isolated from heartwood of Japanese Red Pine (1).]** *J. Jap. For. Soc.* 35 (6), 1953 (199–204). 6 refs. [Jap.e.]

[Cf. *For. Abstr.* 15 (No. 3052).] The following substances were isolated from 2 kg. heartwood: pinosylvin 2·26 g., pinosylvin monomethyl ether 4·18 g., pinocembrin 0·46 g., pinobanksin 0·22 g., dihydropinosylvin monomethyl ether 0·18 g., unknown substance 0·24 g., and *l*-arabinose 0·44 g. The solubility, colour reaction with different chemicals, and effect on sulphite pulping of the different substances, except *l*-arabinose, were determined. The unknown substance resembled the flavone-type phenols to some extent and is probably not one of the pinosylvin-type phenols. The addition of a small amount of each of the phenols to extracted sapwood retarded sulphite pulping, the effect of pinosylvin being greatest and that of pinocembrin and pinobanksin fairly small. [Results are given in tables with English legends.] *From author's summary.*

862. *Composite Materials made Wholly or Partly of Woody Matter*

See also Nos. 4060, 4194, 4199, 4214, 4258, 4353, 4363.

4330. DIETZ, A. G. H., and O'NEILL, A. J. **Composite wood.** *Comp. Wood* 1 (2), 1954 (27–31). P.R.

Gives the definitions and descriptions of laminated wood and wood-waste boards (chipboards), and tabulates physical and mechanical properties of a 'typical' chipboard (mixture of wood chips, sawdust, and urea-formaldehyde, formed under heat and pressure).

4331. NEUSSER, N. Über den derzeitigen Entwicklungsstand der Spanplattenerzeugung. **[The present-day status of chipboard manufacture.]** *Mitt. öst. Ges. Holzforsch.* 6 (2), 1954 (24–7). 94 refs. [G.] P.R.

A general review with 94 references, mostly German and Austrian.

4332. **The Bartrev press.** *Adhesives and Resins, London* 1 (5), 1953 (157–62). P.R.

Illustrated description of the Bartrev manufacturing process producing chipboards from a wide range of fibrous materials (cuttings, tops, branches, and waste), the press producing the finished material in the form of a continuous strip.

4333. PUNGS, L., and LAMBERTS, K. Untersuchungen über die Anwendung von Hochfrequenzerwärmung bei der Herstellung von Holzspanplatten. **[Research on the use of R.F. heating in the manufacture of chipboards.]** *Holz Roh- u. Werkstoff* 12 (1), 1954 (20–5). 4 refs. [G.g.] P.R.

Results of tests on the variation in time of the process of hardening in relation to temperature increase and change of dielectric properties are given in graphs. The loss factor, equivalent resistance, dielectric constant and temperature have been determined as functions of time. R.F. treatment considerably reduces the time of hardening compared with the usual hot-plate method, particularly for the thicker boards.

4334. MACDONALD, M. D. (to State of Oregon). **Method of making composite, consolidated products and apparatus therefor.** *U.S. Patent* 2,658,847, Nov. 10, 1953. pp. 14 + 5 dgms. 12 refs. P.O.

Particles (of wood) are coated with adhesive while both the particles and the droplets of the adhesive form streams, the spray of the adhesive being introduced into the stream of the particles.

4335. WILSON, W. E. **Process for manufacturing composite board.** *U.S. Patent* No. 2,622,276, Dec. 23, 1952. pp. 4 + 3 dgms. 9 refs. P.O.

Wood particles mixed with a suitable binder are placed in a container having an unrestrained and collapsible side wall of thin material, and the whole is subjected to pressure, the side wall serving as the sole means for limiting the lateral spread of the mass.

4336. MARRA, G. G. **Manufacture of hardboard in the United States.** *Paper Tr. J.* 138 (14), 1954 (26 . . . 38). 13 refs. P.R.

Reviews the status of the industry, its rapid development and possibilities of future trends. A classification of processes based on particle types and methods of forming is suggested. Processes and production capacities for each plant are indicated.

4337. KLOOT, N. H. **A survey of the mechanical properties of some fibre building boards.** *Aust. J. appl. Sci.* 5 (1), 1954 (18–35). 9 refs. P.R.

Mechanical tests have been conducted on 20 makes of hardboard and 10 makes of insulating board representing both overseas and Australian manufacture. A number of properties have been determined for the normal dry condition and some for specimens soaked in water for 24 hr. While the variation in properties between makes of one type of building board was found to be large, that within any one make was generally not greater than for most timber species. Soaking reduces the strength properties of both insulating boards and hardboards but the latter are relatively less affected. It is suggested that the variability of each of the two main types of board, together with other factors discussed, indicates the need for setting up standard specifications for this material. *From author's summary.*

4338. ELY, H. M. **Experiments on an accelerated method for determining water absorption of hardboard.** *J. For. Prod. Res. Soc.* 4 (2), 1954 (85–7).

Tests were made on pressure soaking specimens at 5·0 lb./sq. in. for 30 min. at 20° C. and the results were compared with those for the normal 24-hr. water-absorption test. A correlation curve was obtained between the 2 methods, values from which were sufficiently accurate for practical use.

4339. HOLST, H. Svensk standard för träullsplattor. **[Swedish standards for fibreboards.]** *Cement och Betong, Malmö* 27 (3), 1952 (147–52). [Sw.] L.S.

Discusses standards established in 1951 for methods of testing, physical and chemical properties, and dimensions.

4340. BACKMARK, L. Användning av träullsplattor. **[The use of fibreboards.]** *Cement och Betong, Malmö* 27 (3), 1952 (155–61). [Sw.] L.S.

Discusses the use of fibreboards in cellars, outer walls etc. as insulating materials.

4341. HELLEFORS BRUKS AKTIEBOLAG. **An improved method of producing moulded bodies, such as fibrous boards, from vegetable fibrous materials, and products thus obtained.** *Brit. Patent* No. 673,416, June 4, 1952. pp. 3. P.O.

The vegetable fibrous material is disintegrated to a suitable particle size, and then subjected to gentle mechanical treatment in the presence of an aqueous solution containing 0·5–0·7% alkali (calculated as NaOH) at a temperature not below 50° C.; moulded bodies are then produced in a known manner.

4342. SEARS, J. N. (to L. J. Carr & Co.). **Structural board from wood waste, extracted flour of soya beans and melamine-urea formaldehyde resin.** *U.S. Patent* No. 2,658,878, Nov. 10, 1953. pp. 6. 14 refs. P.O.

The board contains $> 80\%$ wood waste ground to suitable size, $< 10\%$ protein binder (extracted soya-bean flour), 1–1·5% melamine-urea formaldehyde binder, and small proportions of NH_4 phosphate, $(NH_4)_2SO_4$, H_3BO_3, $CH_2OH\text{-}CH_2OH$, and Na pentachlorophenate.

4343. ELMENDORF, A. **Fire-resistant boards made of wood strands and inorganic binders.** *J. For. Prod. Res. Soc.* 4 (2), 1954 (87–9).

Two types of board are described. For the first, which has good sound-absorbing properties, strands are cut from green wood, given a chemical treatment, coated with cement in an appropriate mixer, and formed into slabs in a continuous felting operation: the slabs require overnight setting and storage for air-drying and curing for about a week. The second, a porous embedded fibreboard, is made with strands up to 0·15 in. thick, 0·1–0·2 in. wide and 2–6 in. long: they can be blown from the strand-cutting machine to a cyclone and from there to the mixing machine where they are coated with gypsum. The coated strands are sandwiched between two layers of gypsum that form the faces of the board and the resulting assembly is pressed in a continuous press for 5–6 min. after which it is dried and can then be trimmed. The $\frac{1}{2}$-in. embedded fibre-board weighs 2–2$\frac{1}{2}$lb./sq. ft. It has a large potential market for dry-wall construction. Both boards can be manufactured very cheaply.

4344. **New man-made wood opens door for 'cast' products.** *Wood, Chicago* 59 (2), 1954 (30). P.R.

Brief information on the properties and applications of the 'reconstituted wood' ('Castwood') products.

4345. SARETOK, V. Sågspånsbetongens kemi. **[The chemistry of sawdust concrete.]** *Cement och Betong, Malmö* 27 (3), 1952 (135–41). 7 refs. [Sw.] L.S.

Discusses the chemical reactions between sawdust and cement, and pretreatments of the sawdust desirable to ensure products of uniform quality. [Cf. *For. Abstr.* 9 (No. 2336).]

4346. HANSSON, O. Undersökning av träspån medelst 'permanganatmetoden'. **[Investigation of sawdust by the 'permanganate method'.]** *Cement och Betong, Malmö* 27 (3), 1952 (142–6). [Sw.] L.S.

Describes a method of testing the suitability of sawdust for use in sawdust/cement concrete in which the weight of $KMnO_4$ reacting with a given weight of chemically treated sawdust is used as an index of the quality to be expected in the concrete.

4347. KARLSSON, A. Xulenitspån. **[Xulenit sawdust.]** *Cement och Betong, Malmö* 27 (3), 1952 (199–200). [Sw.] L.S.

In the Xulenit method (*Swedish Patent* No. 115,719) of removing substances harmful to the final sawdust/cement concrete, 80 litres sawdust is treated with 0·5 kg. $CaCl_2O$ in 35 litres water. Values of strength and other physical properties of Xulenit concrete are given.

863. *Wood Hydrolysis. Saccharification*

See also Nos. 3969, 4309.

4348. ODINCOV(S), P. N., MEDVEDEV(S), N. A., and IGNATJUK(S), A. G. **The diffusion of sulfuric acid and sugar through [Spruce] wood.** *Latvijas PSR Zinātnu Akademijas Vēstis, Riga* 1950 (4), (75–86). [Russ.] From *abstr.* in *Chem. Abstr.* 48 (4), 1954 (2369). P.R.

Results are given of measurements of the diffusion rate of H_2SO_4 (different concentrations), and aqueous solutions of lactose, and glucose, through Spruce wood, impregnated with water or different concentrations of H_2SO_4.

4349. ODINCOV(S), P. N., MEDVEDEV(S), N. A., and IGNATJUK(S), A. G. **The diffusion of H_2SO_4 and sugars into wood.** *Latvijas PSR Zinātnu Akademijas Vēstis, Riga* 1950 (5), (11–22). From *abstr.* in *Chem. Abstr.* 48 (4), 1954 (2370). P.R.

Presents the results of a study on the diffusion rate of H_2SO_4 and glucose from aqueous solutions into wood in a counter-current diffusion battery.

4350. ODINCOV(S), P. N., MEDVEDEV(S), N. A., and IGNATJUK(S), A. G. **The diffusion of HCl and sugars into wood.** *Latvijas PSR Zinātnu Akademijas Vēstis, Riga* 1950 (6), (23–4). From *abstr.* in *Chem. Abstr.* 48 (4), 1954 (2370). P.R.

Presents results of studies on the diffusion of HCl and glucose in aqueous solutions into wood.

4351. ODINCOV(S), P. N., and MILUTINA, S. V. **Swelling of the cell wall of Spruce-wood fibers in sulfuric acid solutions of glucose.** *Latvijas PSR Zinātnu Akademijas Vēstis, Riga* 1950 (9), (33–50). [Russ.lat.] From *abstr.* in *Chem. Abstr.* 48 (4), 1954 (2370–2371). P.R.

Results of a microscopic study of the swelling of fibres in H_2SO_4 containing various amounts of glucose.

865. *Plastics*

4352. BECKUM, W. G. VAN, and ESTERER, A. K. (to Weyerhaeuser Timber Co.). **Method of impregnating and laminating fibrous materials with lignin.** *U.S. Patent* No. 2,664,377, Dec. 29, 1953. pp. 6. 9 refs. P.O.

Lignin is dissolved in an aqueous solution of NH_3 to form a solution of the NH_4 salts of lignin acids; the preform of the fibrous product is wetted by this solution, and the water content of the latter is evaporated; then heat is applied to decompose the NH_4 salt of lignin into NH_3 and water-insoluble lignin-free acid, after which pressure is applied to the product.

866. *Utilization of Wood Extractives*

See also Nos. 3969, 4367, 4369.

4353. AUSTIN, G. T. **Arabogalactan from Western Larch wood.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (7–10). 8 refs.

A promising method of preparing arabogalactan from chips of *L. occidentalis* by hot-water extraction, vacuum concentration and spray drying has been given pilot-plant tests. Figures for rate of extraction are given in graphs. Data on the properties of the product are tabulated. Insulating board of commercial quality has been prepared from the extracted chips. [Cf. *For. Abstr.* 12 (No. 3024).]

867. *Destructive Distillation*

See also Nos. 3969, 4113.

4354. OGDEN, S. A. **Process for making charcoal.** *Brit. Patent* No. 694,895, July 29, 1953. pp. 2. P.O.

Sawdust, small pieces of wood, or wood sawn into pieces ⊥ to grain, are submitted in thin layers to heat sufficiently high to produce combustion in a few minutes, allowing the substance to flame and removing combustion gases; the residue is then removed from the source of heat, covered so as to exclude air and left to cool.

4355. GREAVES, C., and SCHWARTZ, H. **The chemical utilization of wood.** *Canadian Chemical Processing, Toronto* 37 (10), 1953 (42, 44). L.S.

Brief discussion of the destructive distillation of wood (in Canada mostly Maple, Beech and Birch with, occasionally, Elm and Ash), viz. charcoal burning, brick kilns, ovens, liquid distillate, acetic acid and methanol, and other products.

4356. BERKEL, A., and HUŞ, S. Seyyar madenî kömür ocaklarında kömür imaline ait araştırmalar. **[Experiments in wood distillation with a portable kiln.]** *Istanbul Üniv. Orm. Fak. Derg.* 3*A* (1/2), 1953 (17–28 + 8 plates). 6 refs. [Turk.g.]

Reports trials in distilling Oak (*Quercus sessiliflora*) in a portable kiln of the 'Trihan type Simplex' pattern. Yields were lower than with non-portable kilns because of the inferior insulation of the portable type. *From authors' summary.*

4357. KALNINJŠ, A. I., and OZOLS, O. G. Počti nepreryvnyĭ metod suhoĭ peregonki v vertikaljnyh retortah. **[An almost continuous method of dry distillation in vertical retorts.]** *Trud. Inst. lesohoz. Probl.* No. 6, 1953 (3–17). 5 refs. [Russ.]

Previous work by the same authors (1949–50) showed that internal heating of vertical retorts greatly increased their efficiency, output, and the quality of the products, but at the same time involved two disadvantages, viz. a large heat expenditure and undue dilution of gaseous products. One of the variants of an internally heated vertical retort free from the above drawbacks is illustrated and described. The suggested lay-out consists of 4 retorts with combined internal and external heating. It is claimed that the efficiency of this lay-out is thrice that of an internally heated vertical retort and 2·3 times that of the conventional 'Minsk' type retort.

4358. COMPAGNIE FRANÇAISE DES FOYERS TURBINES. Procédé de distillation du bois et des produits végétaux. **[Method of distilling wood and vegetable products.]** *French Patent* No. 982,059, June 4, 1951. pp. 5 + 7 dgms. [F.] P.O.

The distillation takes place at temperatures rising to 900–1000° C., yielding charcoal with high C % and non-condensable gases of high fuel value; part of the by-products is used as fuel for distillation.

4359. Minami, K., and Kawamura, K. **Studies on the carbonization of wood XIII. Differences in yields of acetic acid in thermal decomposition of wood in [different] kinds of tree.** *J. Jap. For. Soc.* 36 (5), 1954 (136–40). 5 refs. [E.jap.]

Yields for *Quercus glauca*, *Mallotus japonicus* and *Cryptomeria japonica* are shown in graphs. [Cf. *For. Abstr.* 15 (No. 3085).]

4360. Bührer, N. E. Estudos para obtenção de carvão ativo vegetal. **[The manufacture of activated vegetable charcoal.]** *Arquivos de Biologia e Tecnologia, Curitiba* 7, 1952 (103–21). 2 refs. [Port.e.] L.S.

Discusses the properties of charcoal and methods of making it, and reports laboratory experiments in obtaining charcoal from wood (*Mimosa bracaatinga*), coconut shells, walnut shells, and almond shells. In the tests reported, the coconut charcoal had the greatest powers of absorption, with wood charcoal second.

4361. Tanaka, K., and Tachi, I. **[Studies on active carbon (I): Preparation of active carbon by the zinc-chloride process.]** *Wood Res., Kyoto* No. 11, 1953 (42–6). 3 refs. [Jap.e.]

Sawdust of *Pinus densiflora*, *Chamaecyparis obtusa*, *Betula* sp., *Fagus crenata*, *Edgeworthia papyrifera* and *Acacia* sp., and filter paper, sulphite pulp, and lignin from wood saccharification were soaked in 50% $ZnCl_2$, heated for 1 hr. at 80–90° C., dried, carbonized, and activated. Yields of activated carbon from wood were 17·5–34·2% and from waste lignin 54·0%. Figures are given for different absorption values of the activated carbon.

4362. Adam-Gironne, J. Sur la thioréactivité des combustibles. III. Influence de la préchauffe subie par un charbon de bois sur sa thioréactivité. **[The thioreactivity of fuels. III. Influence of pre-heating on the thioreactivity of wood charcoal.]** *Bull. Soc. chim. France* 21 (3), 1954 (360–2). 7 refs. [F.f.] O.R.S.

Cf. *For. Abstr.* 14 (No. 3957).

89. OTHER ('MINOR') FOREST PRODUCTS

See also section 28.

892. *Vegetable Products*

892.4. Bark Products. Tanstuffs. Cork

4363. Humphreys, F. R. **Utilisation of barks from species grown in Australia.** *Tech. Notes For. Comm. (Div. Wood Technol.) N.S.W.* 7 (2), 1953 (21–7). 4 refs.

Discusses actual and potential uses of bark for fuel, tanning, building boards, fibres, cork and miscellaneous extractives (alkaloids and resins).

4364. Jefferies, P. R. **Friedelin and *epi*friedelinol from [the bark of] *Ceratopetalum apetalum* D. Don.** *J. chem. Soc.* Jan., 1954 (473–4). [University of Adelaide.] O.R.S.

4365. Subbaratnam, A. V. **Chemical examination of the bark of *Tabernaemontana dichotoma*, Roxb.** *Curr. Sci.* 23 (2), 1954 (66). 3 refs. A.P.B.

4366. Kurth, E. F., and Tokos, G. M. **The chemical composition of Grand Fir bark.** *Tappi* 36 (7), 1953 (301–4). 18 refs. P.R.

Presents tabulated results of successive extractions of butt, middle and top bark of *Abies grandis* with different solvents. The hexane-soluble fraction was found to be a wax. The tannin content was 7·13% of the oven-dry weight. Hot-water extraction yielded a carbohydrate material containing 17·7% tannin, 8·2% insolubles, 15·6% uronic anhydride, 15·72% pentosans, 1·1% mannan, and other hexosans. The extractive-free bark contained 40·4% lignin and 59·5% cellulose. *From authors' summary.*

4367. Howes, F. N. **Vegetable tanning materials.** Butterworths Scientific Publications, London. 1953. pp. xi + 325. 193 refs. Price £1.15*s.*

Deals at length with the important commercial vegetable tanning materials and also describes or refers to those plants known to be rich in tannin but for which no regular use is found at present. Altogether some 800 species are dealt with.

4368. Dines, A. I., and Bope, F. W. **Extraction and periodate cleavage studies of the tannin obtained from *Pinus caribaea*, Morelet.** *J. Amer. pharm. Ass. (sci. Ed.)* 43 (3), 1954 (172–4). 9 refs. O.R.S.

4369. Istas, J. R., and Hontoy, J. Looistofgehalte van hout en schors van Kongolese houtsoorten. **[Tannin content of the wood and bark of Congo trees.]** *Bull. agric. Congo belge* 45 (2), 1954 (373–6). [Flem. f.]

Gives total tannin % for wood of 13 and bark of 22 spp. collected by Donis about Mayumbe (lower Congo basin).

4370. Chambard, P., and Jullien, I. Tannage avec le tanin de l'écorce d'*Eucalyptus sideroxylon*. **[Tanning with the tannin from the bark of *E. sideroxylon*.]** *Bulletin de l'Association Française des Chimistes des Industries du Cuir, Paris* 14 (9/10), 1952 (158–62). [F.] L.S.

Results of tests show that the tannin from the bark of *E. sideroxylon* can be used: (1) as a bleached extract, and (2) as a bleached extract treated with a suitable synthetic tannin. The latter gives better results in tanning, particularly when mixed with the 'sweetened' Chestnut extract.

4371. Aleem, S. A. **Goran [*Ceriops roxburghiana*] as a tanning material.** *Pakistan J. For.* 4 (1), 1954 (18–20).

Includes tabulated data on tannin content of bark.

4372. Asenjo G., P., and Penna M., M. Análisis tánico de las cortezas de algunos árboles nativos. **[Tannin content of the bark of some native trees.]** In *Bosques y Maderas* [special issue of *Chile maderero*] 1954 (53–4). [Span.]

Results of analyses of 11 species.

4373. Sen, K. R. **An instrument for measuring the hardness of bast fibres.** *J. sci. industr. Res., India* 11*B* (6), 1952 (221–5). 2 refs. D.S.I.R.

Illustrated description of an instrument for measuring the hardness of jute and other bast fibres. The pressure is applied rapidly to the lower surface of the fibre, while its top surface is viewed under a microscope.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants etc.

See also No. 4389.

4374. Petelot, A. Les plantes médicinales du Cambodge, du Laos, et du Viet-Nam. Tome I. Renonculacées à Cornacées. Tome II. Caprifoliacées à Plantaginacées. **[The medicinal plants of Cambodia, Laos and Viet Nam. Vol. I. Ranunculaceae to Cornaceae. Vol. II. Caprifoliaceae to Plantaginaceae.]** Centre National de Recherches Scientifiques et Techniques, Saigon. 1952–53. pp. 408 + 284. Many refs. [F.] E.M.B.

4375. Bisset, N. G. **The steroid glycosides of the Apocynaceae. Part I.** *Madj. Ilmu Al. unt. Indones.* 109 (4/6), 1953 (173–211). 3 pp. of refs. [E.e.] E.M.B.

A survey of the species containing cardiotonic glycosides.

4376. Youngken, H. W. **A pharmacognostical study of *Rauwolfia*.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 43 (2), 1954 (70–8). 17 refs. O.R.S.

Discusses the history of the use of drugs from *Rauwolfia* spp., describes *R. serpentina*, *R. canescens*, *R. micrantha* and *R. densiflora* and their distribution, and gives detailed descriptions, with photomicrographs, of their root anatomy and discusses its use in identification.

4377. Youngken, H. W. **Malabar Rauwolfia, *Rauwolfia micrantha* Hook. f.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 43 (3), 1954 (141–3). O.R.S.

Describes the physical characteristics and histology of the root and gives a table of principal differences between roots of *R. micrantha*, *R. canescens* and *R. serpentina*, and the results of tests for alkaloids in *R. micrantha* roots.

4378. Rajagopalan, S. **Recent developments on *Rauwolfia serpentina* Benth.** *J. sci. industr. Res., India* 13*B* (1), 1954 (77). D.S.I.R.

Gives the results of preliminary determination of the alkaloid content (total, and reserpine) of *R. serpentina* roots of the Western Ghats. The average reserpine content is 0·04–0.05%.

4379. Nukumizu, T., and Nishimura, H. **[Observations on the development of fruit-bodies of Shiitake-fungus (*Cortinellus edodes* (Berk.) S. Ito and Imai) and the durability of bed-logs.]** *J. Jap. For. Soc.* 35 (2), 1953 (64–5). [Jap.]

In Japan *C. edodes* is commonly cultivated for the table on a 'bed' of logs propped up in a shady place to form a gable roof, the upper surface of which is infected with 'spawn'. The authors found that the best conditions for growth were 75–80% air humidity and a temperature exceeding 15° C. The timber species (*Quercus serrata*) used for the 'bed' lost 20·6% of its natural weight after one year's cultivation and 50·6% after 5 years' cultivation of the fungus.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 3169, 3296, 3597.

4380. Pejoski, B. Points de vue scientifiques contemporains sur les résines végétales. **[Contemporary scientific opinions on vegetable resins.]** *Schweiz. Z. Forstw.* 105 (3/4), 1954 (201–6). 28 refs. [F.]

A review of some of the literature on the chemistry of resins.

4381. Pejoski, B. Neke karakteristike smole munike (*Pinus heldreichii*, Christ var. *leucodermis*, Antoine, Markgraf). **[Some characteristics of the resin of *P. leucodermis*.]** *Šum. List* 77 (11), 1953 (450–8). 6 refs. [Croat.f.]

Describes the flow rate of resin during tapping, and its solidification ('crystallization'), and gives several physical properties of the turpentine obtained.

4382. Pęcikiewicz, M. Wlasności balsamicznej żywicy sosnowej i produktów jej destylacji. **[Properties of *Pinus sylvestris* oleoresin and of its distillation products.]** *Roczn. Nauk leśn.* 3, 1953 (3–38). 11 refs. [Pol.russ.f.] (*Prace Inst. Bad. Leśn.* No. 97.)

Presents results of tests on over 1000 samples of crude resin from *Pinus sylvestris* in Poland, belonging to the following 3 groups: (1) viscous; white or cream-coloured; water content < 5·0%, impurities < 0·5%; (2) semi-liquid, or viscous; white or grey; water 5·0–10·0%; impurities 0·5–1·0%; (3) liquid or semi-liquid; white, grey or brown; water < 15·0%; impurities 1·0–1·5%. Polish oleoresin has the following properties: density 1·008–1·035 g./c.c.; m.p. 90–130° C.; acid value 110–175; saponification value 120–175; rosin content 60–75% (92% in dry oleoresin); turpentine oil 10–36%; water up to 15 %; organic impurities 0–1·3%; inorganic impurities < 1%. The turpentine distilled from the oleoresin is a transparent and colourless liquid, density 0·8560–0·8650 g./c.c., initial b.p. 110–160° C., refractive index 1·4700–1·4850, acid value 0·1–0·4, Br value 180–280, residue after distillation 0·1–4·0%; rosin produced in Poland on a commercial scale corresponds to French grades 3A, WW, N, M, K, and F. Its properties are: density 1·060–1·082 g./c.c.; softening point 56·2–80° C.; acidity in terms of CH_3COOH, 0·01–0·69%; acidity of impurities (ash) 0·01–0·5%; water < 0·5%; oxyacids 0·3–5·0%; acid value 121·8–180·3; saponification value, 130·4–198·9; ester value < 33·75.

4383. Mirov, N. T. **Chemical composition of gum turpentine of Pines of the United States and Canada.** *J. For. Prod. Res. Soc.* 4 (1), 1954 (1–7). 30 refs.

Shows in tabular form the turpentine composition of 47 species and varieties of Pine, i.e. all American Pines growing north of the Mexican border except *P. arizonica* and *P. remorata*, which have not yet been investigated. [Cf. *For. Abstr.* 15 (No. 971).]

4384. Mirov, N. T., Iloff, P. M., Jr., and Gordon, L. B. **Composition of gum turpentine of Pines. XVIII. A report on *Pinus pungens*, *P. glabra* and *P. teocote*.** *J. Amer. pharm. Ass.* (*sci. Ed.*) 43 (1), 1954 (13–5). O.R.S.

4385. Soepardi, R. Perusahaan minjak kaju putih. **[Cajuput oil.]** *Rimba Indonesia* 2 (10/12), 1953 (431–74). [Jav.e.]

Attempts to modernize the distilleries on the Island of Buru, where *Melaleuca leucadendron* is indigenous, have failed. The tree has been used for afforestation of poor soils in E. Java and the following data have been obtained: (1) The annual yield per tree is 1·1 kg. of leaves, and, per ha., 5500 and 3500 kg. of leaves for spacings of 1 × 2 m. and 1 × 2½ m. respectively; (2) the rate of harvesting is 8·5 kg. of leaves per man-hr. and 1 ha. can be harvested by 405 men in 1 hr., by 58 men in 1 day and by 9–10 men within a week; (3) the yield by distillation in the laboratory was 0·90% from the fresh leaves, and actual commercial yields are 0·85%; and (4) the oil from E. Java has a cineol content of 57%, sp. gr. 0·88 and refractive index 1·465.

4386. Penfold, A. R., Morrison, F. R., Willis, J. L., McKern, H. H. G., and Spies, M. C. **The essential oil of a physiological form of *Eucalyptus citriodora* Hook.** *Journal and Proceedings of the Royal Society of New South Wales, Sydney* 85 (3), 1951 (120–2). 2 refs. L.S.

Presents results of a chemical investigation of essential oil obtained from 'Variety "A" ' *Eucalyptus citriodora*. [Cf. *For. Abstr.* 10 (No. 2465).]

4387. Birch, A. J., Mostyn, K. M. C., and Penfold, A. R. **The sesquiterpene alcohols of *Eucarya spicata* Sprague and Summ.** *Aust. J. Chem.* 6 (4), 1953 (391–9). 12 refs. [University of Sydney.] O.R.S.

4388. Naves, Y.-R., and Ardizio, P. Études sur les matières végétales volatiles. CXXX (1). Présence de lancéol dans l'huile essentielle de bois de santal de Kenya (*Osyris tenuifolia* Engler). **[Volatile vegetable substances. CXXX (1). The presence of lanceol in the essential oil of *O. tenuifolia.*]** *Bull. Soc. chim. France* 21 (3), 1954 (334–7). 14 refs. [F.f.] O.R.S.

The essential oil of *O. tenuifolia*, like that of *Santalum lanceolatum* contains a large amount of lanceol.

4389. Korta, J. **Essential oils from *Rhododendron ponticum* and their toxicity.** *Dissertationes Pharmaceuticae, Polska Akademia Umiejętności, Kraków* 4, 1952 (123–55). From *abstr.* in *Chem. Abstr.* 48 (9), 1954 (5445*i*). P.R.

The usual characteristics are presented for the essential oils obtained from fresh flowers, dried flowers, and leaves of *R. ponticum*; the oils are highly toxic and have bacteriostatic effect, especially to *Bacillus anthracis*. Flowers (and in lesser amounts, other parts of the tree) contain arbutine and andromedotoxine.

4390. Ehlers, V. B., and Hill, G. A. **Chemical investigation of the New England Horse Chestnut, *Aesculus hippocastanum*.** *Journal of the American Oil Chemists' Society, Champaign, Ill.* 28 (2), 1951 (45–6). 11 refs. L.S.

The oil from the fruit of American-grown *A. hippocastanum* has been found to be similar to that of European-grown fruits. It is of the non-drying type. Its composition and chemical properties are tabulated.

4391. Novelli, A. **Affinity of sambucyanin for nucleic acids.** *Nature, Lond.* 173 (4406), 1954 (691). 1 ref. [Department of General Pathology, University of Geneva.]

The presence has been demonstrated in *Sambucus nigra* berries of a dyestuff, sambucyanin, which can be used as a nuclear stain and has a selective affinity for nucleic acids.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. GENERAL

4392. **Report of the Minister of Lands on Forestry for the period from 1st April, 1950 to 31st March, 1953.** Stationery Office, Dublin. 1953. pp. 54 + map. Price 2*s*. 6*d*.

4393. BUCHHOLZ, E. Organisation und Politik der sowjetischen Forst- und Holzwirtschaft. **[Organization and policy of forestry and the timber industry in the Soviet Union.]** *Z. Weltforstwirt.* 17 (1), 1954 (1–10). 20 refs. [G.e.f.]

A general account of administration and policy during the last 35 years.

902. *History of Forests and Forestry*

See also Nos. 3369–71, 3403–5, 3407.

4394. BOOTH, G. A. **The forests of the Upper Nile Province 1862–1950.** *Memoirs of Forestry Division, Ministry of Agriculture, Sudan* No. 5, 1952. pp. 16 + 3 photos. (*Repr.* from *Sudan Notes and Records, Khartoum* 33, 1952 (113–28).)

An historical account of forest exploitation along the river with details of early trials (with costs) in sowing *Acacia* spp., chiefly Sunt (*A. arabica*). The first pit sowings failed mainly owing to excessive inundation. Scarcity of labour and high costs preclude the more successful mound planting. The use of a tractor and Killifer ridger (30- to 33-in. ridges) will extend the area suitable for Sunt sowings. *Acacia seyal*, *Zizyphus spina-christi* and *Dalbergia melanoxylon* will all regenerate naturally on a short rotation unless cut when over-mature and thinning out. *A. seyal* provides by far the greatest part of the fuel. It withstands fire, and the coppice and seedling regeneration from young stands after burning is remarkable. Judging from instances of repeated natural replenishment in the stands supplying the steamer fuelling stations, it is considered that little or no over-all reduction in these forests has occurred, and confirmation of this from aerial photography is confidently expected.

904. *General Regional Accounts of Forests and Forestry*

4395. La forêt. **[The forest.]** *Terres de France, Paris* No. 5, 1954. pp. 71. [F.]

A special number devoted to French forests and forestry, with particular reference to policy, state supervision etc., and including articles on the École des Eaux et Forêts at Nancy, the French paper industry and chemical utilization of wood.

4396. DUGELAY, A. Les forêts provençales (Département du Var). **[Forests of Provence (Département Var).]** *Rev. Bois Appl.* 9 (3), 1954 (4–13). [F.]

4397. KRISHNASWAMY, V. S. **Forest development of Andhra State [, Madras].** *Indian For.* 80 (2), 1954 (67–71). 9 refs.

4398. DAVIDSON, D. F. **Diary of a visit to the forests of Morocco, including a short visit to Algeria.** *Emp. For. Rev.* 32 (3), 1953 (239–50 + 8 photos); 33 (1), 1954 (48–60 + 8 photos).

4399. Sonderheft 'Die Forstwirtschaft der USA in deutscher Schau'. **[Special number: 'Forestry in the U.S.A. from the German point of view'.]** *Forstarchiv* 24 (1/3), 1953. pp. 108. Many refs. [G.]

Contains papers on the following topics by German foresters who have travelled recently in the U.S.A.: The present position in U.S. forestry (*E. G. Strehlke*); The forest and the people [publicity, recreation etc.], and The organization of the U.S. Forest Service (*S. Graf von der Recke*); Private forests, and public measures to promote good management (*M. von Raven*); Forest fire control (*A. Frhr. von Vietinghoff-Riesch*); Forestry education and research (*D. Hoffmann*); On both sides of the Cascades [: site factors, forest types and notes on tree species] (*F. Querengässer*); The dynamics of development of north-western American forest types: lessons for W. European silviculture (*F. E. Eidmann*); Forestry in New Jersey (*M. von Raven*); Fungus diseases of N. American trees; efforts towards their control, with special reference to tree breeding (*F. Querengässer*); Aerial photography as a basis for forest inventories, with conclusions regarding future development in Germany [and special reference also to the use of modern statistical methods] (*F. Loetsch*). Most of these papers are illustrated and have summaries in German, or German and English; some carry bibliographies. The issue also contains a tribute to C. A. Schenck on the occasion of his 85th birthday, and a brief note on forestry literature in the U.S.A. (both by *E. G. Strehlke*). The reviews section is also given over entirely to works dealing with American forestry.

4400. ROULEAU, J. Les ressources forestières des Nouvelles-Hébrides. **[The forest resources of the New Hebrides.]** *Bois For. Trop.* No. 34, 1954 (9–13). [F.f.e.span.]

4401. JOLIFFE, W. H. **The dawn of forestry in the Cook Islands.** *Emp. For. Rev.* 33 (2), 1954 (132–3 + 3 photos).

A short note on the remaining forest and the plans for planting *Albizzia falcata* in order to provide box shooks for the citrus fruit industry.

905. *Forest Statistics and Resources*

See also Nos. 3400, 3968.

4402. Metsätilasto: kertomus metsähallinnon toiminnasta VV 1949–50. **[Forest statistics: report on the activity of the State Board of Forestry in 1949–50.]** *Suomen Virallinen Tilasto* (*Ser. XVII*) No. 40, 1954. pp. 80. [Fi.Sw.e.]

4403. HAGBERG, E., and TERSMEDEN, C. Riksskogstaxeringen av Västsverige åren 1949–1951. **[The state forest survey of West Sweden 1949–51.]**

Medd. SkogsforsknInst., Stockh. 44 (4), 1954. pp. 63. 6 refs. [Sw.sw.e.] Price *Kr*.4.

Results are tabulated and changes since the previous survey in 1928–29 are discussed.

4404. **Handbook of statistics of agriculture, forestry and fisheries, Japan, 1953.** Association of Agriculture-Forestry Statistics, Tokyo. 1953. pp. 130. [E.] Compiled by Statistics and Survey Division, Ministry of Agriculture and Forestry. Price *Yen* 350 (12*s*. 10*d*.).

4405. ATKINSON, J. M., and PALLEY, M. N. **Forest resources of the Pasquia-Porcupine area of Saskatchewan.** *For. Invent. Ser. For. Br. Sask.* No. 1, 1952. pp. 23 + map.

4406. **Forest resources of the Meadow Lake area of Saskatchewan.** *For. Invent. Ser. For. Br. Sask.* No. 3, 1954. pp. 32 + map.

4407. ROTTY, R. **Forest and shelterbelt planting in the United States during 1953 (July 1, 1952–June 30, 1953).** *Tree Plant. Notes* No. 15, 1954. pp. 5 + 5 tbls.

Gives figures (by states) of acreages planted by private, state and federal agencies and number of seedlings raised and distributed by state nurseries.

4408. **Status of the forest resource in the Tennessee Valley—1950.** Division of Forestry Relations, T.V.A., Norris, Tenn. Rep. No. 206–53, 1953. pp. 32 + 2 maps.

Statistics based on sampling of 23% of the forest area.

4409. SIREGAR, B. H. Eksploitasi penggergadjian dan pengelolaan hutan didaerah hutan Bengkalis/Kampar. **[Exploitation, sawmills and forest administration in the forest district of Bengalis/Kampar [Sumatra].]** *Rimba Indonesia* 3 (1/2), 1954 (69–81). 10 refs. [Jav.e.]

4410. UNWIN, P. **Estimate of timber resources—Tasmania.** *Aust. Timb. J.* 20 (1), 1954 (26 . . . 35).

Includes, as well as forest and timber statistics, details of inventory methods used.

907. *Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)*

See also section 116.

4411. SHANKLIN, J. F. **Natural areas.** *J. For.* 52 (5), 1954 (375–83).

Gives a list of 304 cover types for the U.S.A., Alaska, and Puerto Rico and details of the natural areas protected within them. Of these types 79 are not represented by protected areas.

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also section 116 and Nos. 3580, 3586, 4407.

4412. **Report of the commission of enquiry into crofting conditions.** H.M. Stationery Office, Edinburgh. *Cmd.* 9091, 1954. pp. 100.

Discusses, *inter alia*, the question of afforestation in the Western Highlands, with particular reference to the Duke of Westminster's estate of Reay in Western Sutherland. The Forestry Commission is strongly recommended, as a matter or urgency, to pursue an energetic policy of afforestation as an essential step towards the secure establishment of the crofting communities.

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

4413. GROSSMANN, H. Zusammenlegung zerstückelter Privatwaldungen in der Schweiz mit besonderer Berücksichtigung des Kantons Zürich. **[Consolidation of scattered private forest holdings in Switzerland, with special reference to the Canton of Zürich.]** *Allg. Forst- u. Jagdztg.* 124 (5), 1953 (145–53). [G.]

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

4414. **Northern Rhodesia: Forests: Chapter 105 of the laws, 1953 edition.** Government Printer, Lusaka. 1953. pp. 50.

4415. **Northern Rhodesia: control of bush fires and trespass: Chapter 107 of the laws, 1952 edition.** Government Printer, Lusaka. 1952. pp. 15.

4416. **An Ordinance to provide for the protection and management of the forests of the Colony [of Sarawak], and to regulate the taking of forest produce: 18 Sept. 1953.** *Food agric. Leg.* 2 (4), 1953 XIII. 1/53.2. pp. 16.

4417. LEWIS, E. A. [Compiler]. **Laws relating to forestry, game conservation, flood control, and related subjects.** U.S. Government Printing Office, Washington. 1952. pp. 415. Price $1·25.

The corpus of U.S. federal laws on these subjects.

4418. DAVILA OLIVO, G. Política y legislación forestal en Puerto Rico. **[Policy and forest legislation in Puerto Rico.]** *Bol. Ingen. for. Univ. Los Andes* No. 2, 1954 (18–25). 4 refs. [Span.]

4419. CAÑEDO-ARGÜELLES QUINTANA, E. DE. Los montes de particulares ante el estado, en Europa. **[Private forests and the state, in Europe.]** *Montes, Madrid* 9 (53), 1953 (393–7); 10 (55), 1954 (13–22). [Span.]

A historical review, based on literature, of legislation affecting private forests in Germany.

4420. BOCK, F., and RICHTER, H. Entwicklung, Organisation und Aufgabenkreis der bundesstaatlichen Wildbach- und Lawinenverbauung in Österreich. **[Development, organization and field of activity of federal stream training and avalanche control in Austria.]** *Z. Weltforstwirt.* 17 (1), 1954 (10–7). [G.e.f.]

Surveys federal activity over the last 70 years and discusses similar activities in France, Switzerland, Liechtenstein, Italy and Germany.

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

4421. **State aid available to woodland owners [in Great Britain]: planting and maintenance grants, loans, technical advice.** Forestry Commission, London. Rev. ed., 1954. pp. 12.

943. *Forest Insurance*

4422. COFFIN, E. L'assurance forestière en France. **[Forest [fire] insurance in France.]** *Rev. for. franç.* 6 (3), 1954 (179–86). [F.]

944. *Co-operation. Collaboration of Forest Owners*

See No. 3951.

945.2. *Publicity, Propaganda*

4423. RÓTH, G. A Sopron-hidegvízvölgyi föiskolai tanulmányi szalalóerdö. **[The selection forest of the Sopron forest school.]** *Erdömérnöki Föiskola Évkönyve Sopron 1951/52, Budapest* 1953 (161–94). [Hung.russ.g.]

A detailed history and description, with illustrations and maps.

945.3. *Education. Training*

See also No. 3600.

4424. Pet godini od osnivanjeto na zemjodelsko-šumarskiot fakultet pri univerzitetot vo Skopje (1947–1952 god.). **[Five years from the establishment of the Faculty of Agriculture and Forestry in the University of Skopje (1947–52).]** Zemjodelsko-šumarski Fakultet, Skopje. 1953. pp. 48. [Maced. f.]

The establishments of the forestry section in 1951–52 provided for: 4 professors, 7 lecturers, 3 teachers, and 11 assistant lecturers. The section is divided into 4 'chairs', another 3 serving both the forestry and agriculture sections. The annual intake of students is ca. 40.

4425. MARCKWORTH, G. D. **Statistics from the [U.S.A.] schools of forestry for 1953. Degrees granted and enrollments.** *J. For.* 52 (5), 1954 (354–8). 20 refs.

Gives in addition all the references published in this journal covering the same statistics during the period 1932–51.

4426. DUNN, P. M. **Forestry education in Chile.** *J. For.* 52 (5), 1954 (329–32).

Outlines the forestry situation, the recent institution of a five-year degree course, research, and budgeting provision for departmental staff and works, and legislation.

945.4. *Research*

See also Nos. 3211, 3405, 3972–5, 4124, 4432.

4427. VEIGA, A. DE ARRUDA. Experimentação em silvicultura—contribuição para a pesquisa e experimentação em silvicultura. **[Forest research—tests and experiments in forestry.]** *Publicação, Secretaria da Agricultura, São Paulo* No. 851, 1953. pp. 12. 2 refs. [Port.] (*Repr.* from *Boletim de Agricultura, São Paulo*, 1951.)

Notes on the design of experiments in various branches of forestry as carried out at the Horto Florestal de Batatas.

946.2. *Conferences and Excursions*

4428. Atti del Congresso nazionale del Pioppo (Rovigo 15 novembre 1953). **[Proceedings of the [Italian] national Poplar Conference (Rovigo 15 Nov. 1953).]** *Pubbl. Ente naz. Cellulosa Carta, Roma* 1954. pp. 257. [It.]

The papers and discussions deal mainly with the economic aspects of Poplar growing in Italy. An exception is a paper by *D. Rui*, *G. Giraldi* and *F. Bellavite* on Poplar pests in Veneto, dealing with outbreaks of (1) *Phloeomyzus passerinii*, and (2) *Dothichiza populea*.

4429. Bosques y Maderas. Primer Congreso Forestal Maderero Nacional. **[Forests and timbers. First [Chilean] National Forestry and Timber Conference.]** Corporación Chilena de la Madera, Santiago. 1954. pp. 79. [Span.] [Special issue of *Chile maderero*.]

95. FOREST TAXATION

4430. WILKES, G. C. **Taxation of forest industries in Ontario.** *Univ. Toronto For. Bull.* No. 3, 1954. pp. ix + 102. 78 refs. Price $2·00.

Contains chapters on: forest resources and taxation; history of forest taxation in Ontario; taxes and other government charges; forest taxation in other countries (Scandinavia, France, U.K., and U.S.A.); taxation and tenure; and taxation and forest policy.

4431. PORTALUPPI S., A. Aspectos de legislación tributaria en la agricultura forestal. **[Aspects of the law governing taxation in forestry.]** In *Bosques y Maderas* [special issue of *Chile maderero*] 1954 (68–72). [Span.]

A discussion of the Chilean law.

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses. Conferences*

See also Nos. 3586, 3980, 4060, 4309.

4432. La seconda sessione della Commission Internationale du Peuplier dal 20 al 28 aprile 1948. **[The Second Session of the International Poplar Commission 20–28 April 1948.]** Ente Nazionale per la Cellulosa e per la Carta, Rome. 1953. pp. 247. Price *Lire* 500.

The proceedings of the congress and papers presented are given either in French or in Italian. They include the following in French: Identification of Poplars in N. Italy (*R. Régnier* and *G. Houtzagers*); Rationalization of the use of Poplar in the timber industries (*G. Meunier* and *G. Giordano*); Diseases and injuries to Poplars in Italy (*A. Pavari* and *G. Piccarolo*); Problems of Poplar-growing in the Mediterranean region (*A. Pavari*); The Istituto di Sperimentazione per la Pioppicoltura and Poplar breeding (*G. Piccarolo*); and the following in Italian: Fungus and organic diseases of Poplar (*R. Cifferri* and *E. Baldacci*); The activities of the Ente Nazionale per la Cellulosa e per la Carta (*L. Chianese*); Poplar-growing and the State hydraulic schemes in the Po basin (*G. Mariani*); Induced polyploidy in the genus *Populus* (*W. Vivani* and *M. Sekawin*).

4433. **Report of the Seventh Session of the International Poplar Commission: Germany—May 1953.** FAO, Rome. 1954. pp. 85.

Includes reports on Poplar identification, cultivation, diseases and pests, based on a study tour in Western Germany; also notes on nomenclature—see *For. Abstr.* 15 (Nos. 3317–8).

4434. **Proceedings of the Seventh Pacific Science Congress of the Pacific Science Association held at Auckland and Christchurch, New Zealand, 22nd February to 4th March, 1949. Vol. VI. Soil resources, forestry and agriculture.** [Royal Society of New Zealand, Wellington, N.Z.] 1953. pp. 292.

The forestry section (pp. 266–92) contains abstracts of a number of papers already published in full elsewhere, and two papers in full: Forestry problems in the South Pacific (*C. Marshall*) and The FAO forestry organization, the Pacific Science Congress, and the Asia-Far East Region (*M. Leloup*).

FORESTRY THE WORLD OVER

References: 1. *Burmese Forester*, Rangoon; 2. *East African Agricultural Journal*, Nairobi; 3. *FAO Publication*, Rome; 4. *Forest Farmer*, Valdosta, Ga.; 5. *India News*, London; 6. *Lumberman*, Seattle; 7. *Monthly Bulletin of the Iranian Forest Service*, Teheran; 8. *Nature*, London; 9. *Naval Stores Review*, New Orleans; 10. *New Commonwealth*, London; 11. *Paper Trade Journal*, New York; 12. *Press Release, Forestry Branch*, Ottawa; 13. *Pulp and Paper Magazine of Canada*, Gardenvale, Que.; 14. *Report of the Forest Department, Trinidad*, Port of Spain; 15. *Southern Lumberman*, Nashville, Tenn.; 16. *Timber Trades Journal*, London; 17. *Times*, London; 18. *Unasylva*, Rome; 19. *Wood*, London.

International.

FAO. Preliminary arrangements have been made for a seminar on Forest Policy at Istanbul University, open to Near East directors of forest services and chiefs of forest and land departments. The seminar, tentatively fixed for August 1954, will include 2 weeks of lectures and discussions at the university, and field excursions in Turkey. Subjects will include forest policy, organization of forest services, forest administration, legislation, and the development of research and training (**3**; May 1954).

A Latin-American conference on pulp and paper is to be held at Buenos Aires from 18th October to 2nd November, sponsored by FAO, the Economic Commission for Latin America, and the Technical Assistance Administration. Among subjects to be discussed are the technical and economic aspects of pulp and paper manufacture from hardwoods from tropical mixed broadleaved forests, conifers from natural forests and plantations, Eucalypts and Poplars from plantations, and sugar-cane bagasse (**3**; 10.8.54).

Other bodies: The 4th World Forestry Congress will be held in Dehra Dun at the Indian Forestry Institute during 11–22 December. This is the first occasion on which the congress has been held outside Europe, and special emphasis will be laid on tropical forestry. In addition to tropical silviculture, the discussion will include desert areas and the problems arising from shifting cultivation in various parts of the tropics. Besides visits to forest areas in India, arrangements have also been made for the delegates to make tours in Pakistan (**8**; 28.8.54).

A symposium on the vegetation types of India will be held by the Indian Botanical Society in Baroda at the end of December 1954. Among the types to be discussed will be forests, grasslands, aquatic vegetation, Mangrove, and desert vegetation (**8**; 17.7.54).

A conference on the conservation of nature in the Near and Middle East was held at Beirut during 3–9 June, organized by the president of the Lebanese Society of the Friends of the Trees and the Unesco Middle East Scientific Co-operation Office. It was attended by scientists and others from Cyprus, Egypt, Greece, Iraq, Jordan, Lebanon, Syria and Turkey. Among subjects discussed were the regression of forest owing to goat-grazing, charcoal burning, fuel collection etc. A full report of the conference will be prepared by Unesco (**8**; 14.8.54).

The Comité International de Photobiologie, formerly known as the Comité International de la Lumière, was to hold a congress in Amsterdam, 23–28 August. The three sections covered the following branches of the subject: (1) medicine, (2) biology, and (3) physics. There were also to be 3 general symposia, including one on photoperiodism in plants and animals. The official language of the congress was French, but German and English were also used (**8**; 5.6.54).

An international symposium on peat was held in Dublin during 12–17 July. Peat resources and development in Canada, Denmark, England and Wales, Eire, Finland, France, Germany, Netherlands, Northern Ireland, Norway, Scotland and Sweden were discussed at the first session. Other sessions were devoted to methods of survey; general and technical classification of peat; milled peat; sod peat; dehydration; large- and small-scale plants for utilization of peat, use of gas turbines; peat coke and wax; gasification; and reclamation (afforestation, agriculture, and soil conditioning) (**8**; 3.7.54).

The Fifth International West African Conference was held at Abidjan during December 1953. The working sections were those of zoology, botany (including forestry), geography (including geology), and ethnology-sociology (including economics). The conference meets every second year, alternating between British, French, Spanish, and Portuguese territories (**8**; 3.7.54).

Argentina. Argentina's first forestry school was established at the Facultad de Agronomía y Veterinaria, Buenos Aires University, on 1st April 1954. The course includes 3 years of agriculture and 2 of forestry (**3**; 1.4.54).

Burma. A scheme for the afforestation of, and formation of village forests in, the dry zone, drawn up by the Chief Conservator of Forests, has been adopted by the Agricultural and Rural Development Corporation for immediate implementation. Two classes of forest (village fuel and pole forests, and protection forest) will be formed on the large areas of waste or submarginal land in the vicinity of villages. They will be owned, managed, and protected by the villagers themselves, under the technical supervision of the Forest Department (**1**; June 1954).

Canada. Leaders of forest industries in British Columbia will give help, through an advisory committee, in planning research at the Vancouver Forest Products Laboratory. The value of such close co-operation between science and industry has been learned through experience. A similar committee has advised the Ottawa laboratories on their research programme for the past four years (**12**; 1.6.54).

A new type of small motor craft—'boom scooters'—for handling and sorting logs, has been introduced by MacMillan and Bloedel Ltd., in the booming grounds south of Port Alberni, British Columbia. The craft, 8 ft. long and 4 ft. wide, are constructed of ⅛-in. steel plate. For complete stability the bottom of the hull is formed in the shape of an inverted V, and a deck seals in the 'legs' of the hull to make buoyancy tanks. A standard 8-h.p. outboard motor is mounted in a well a little aft of the centre of the boat in such a way that full 360° swing is permitted, thus ensuring maximum manoeuvrability (**16**; 28.8.54).

Czechoslovakia. A law promulgated in November 1953 set up a central administration for the country's water supplies under the Ministry of Forests and Forest Industries. Its functions include responsibility for purification of water supplies, regulation of stream flow, navigability of waterways and construction of canals, and collaboration with the Ministry of Fuel and Power in the development of hydro-electric schemes (**18**; June 1954).

Finland. A reserve fund known as the Forest Improvement Fund, of at least 310 million marks in 1953 and at least 600 million marks per annum in 1954–57, has been established for forest improvement work on private forest land and the improvement of transport facilities. Loans at low interest and subsidies may be granted for such purposes from the Fund (**3**; 1953).

Great Britain. Two Auster aircraft are to be used in a campaign to eradicate the Pine looper (*Bupalus piniarius*) from 2500 acres of the forest of Cannock Chase in Staffordshire where more than 100,000 trees are threatened. The area is to be sprayed with a DDT emulsion and the aircraft will then proceed to spray 3500 acres of Pine plantations at Culbin on the Moray Firth, where there is another outbreak (**17**; 9.8.54).

The 'Brettell' hydraulic puller and tensioning device manufactured by A. G. Wild & Co., Ltd., of Sheffield, was primarily designed to speed up the withdrawal of pitprops below ground but could also be used in, for example, loosening and removing tree stumps. It consists of a double-acting hydraulic pump, manually operated. A pull of 10,000 lb. can be exerted by single-handed operation of the lever, but the total carrying weight is only 44 lb. (**16**; 15.5.54).

A heavy-duty winch, the Boughton model C, designed for the International crawler tractors, has been introduced recently by the International Harvester Co. of Great Britain Ltd. The winch has a drum diameter of 6 in., flange diameter of 16 in., and weighs about 9 cwt. The maximum rope capacity is 150 yards for ½-in.-diam. rope, 100 yards for ⅝-in. and 75 yards for ¾-in. It is designed mainly for use with a logging arch or skid-pan for extracting and transporting logs but could also be used for pulling stumps or felling timber (**19**; May 1954).

The 'Gorwood' barking machine introduced by J. R. Gordon & Co. of Chester has proved capable of an average output of 150 cu. ft./hr. on logs averaging 4–5 in. diam. It is designed to handle short lengths, 1–7 ft., but will deal successfully with any moderately straight length. Logs of 2–8 in. top diameter can be handled and the varying diameters can follow each other through the machine without a pause for adjustment. The design allows complete barking of slightly crooked timber. Bark is removed by pressure between 3 specially designed rollers, the log being propelled forward and rotated at the same time. There is no danger of damage to the wood or loss of diameter. There are portable and stationary models (**16**; 10.7.54).

A new heavy-duty stationary chain saw manufactured by Teles Smith, Ltd., 8 South Wharf, Paddington, London, W.2, on show at the Royal Show at Windsor, cross-cut an Oak butt 5 ft. 6 in. in diameter in 2½ min. For maximum efficiency the machine should be mounted permanently on a concrete base near a crane. A 10-h.p. electric motor provides the power. Cutter bars of 5, 6 or 7 ft. capacity are available. The 'Teles' chipper chain is used to give high cutting rates. The machines may be equipped for A.C. or D.C. operation (**16**; 7.8.54).

A wall-covering consisting of timber slats of veneer thickness joined by glued threads has been exhibited in London by Arthur Sanderson and Sons Ltd., 52 Berners Street, London, W.1. The material, 'Rollywood', was invented by the Swedish interior decorator, Eric Matson. Timbers used include Mahogany, Walnut, Obeche and Aspen, and material can be obtained made of one timber exclusively or combining slats of two species to form a striped pattern. It is available in widths up to 12 ft. and lengths to 165 ft. (**19**; May 1954).

Honduras. A forest service came into being on 1 July 1953 under the Dirección General de Bosques, Aguas, Minas y Tierras of the Ministry of Agriculture. Work has been started on a general survey of forest resources, establishment of nurseries, forest reservation plans, and preparation of a new forest law (**18**; June 1954).

India. Additional equipment and supplies are to be provided to the Forest Research Institute, Dehra Dun, to augment the present facilities for research on forest products under the Technical Co-operation Programme. It is proposed to acquire equipment and supplies for laboratory research, pilot-plant studies and field studies, and for the reproduction and dissemination of scientific findings (**5**; 19.6.54).

A simple and economic process for the isolation of saponins from Indian soapnuts [fruit of *Sapindus* spp.] has been developed by the National Chemical Laboratory, Poona. The product is a greyish-white powder which dissolves easily in water to give solutions with excellent lathering properties. The commercial grade of saponin obtained is estimated to cost ca. Rs. 2 per lb. from a plant having a capacity of one ton of nuts per day (**5**; 24.7.54).

Mauritius. The Forestry Adviser to the Secretary of State for the Colonies has recently visited Mauritius and approved plans drawn up by the Conservator of Forests to have 12,000 acres under forest and to provide for the felling and replanting of 400 acres each year (**10**; 18.3.54).

Persia. The Government, through the Azerbaijan Tillage Co., and with the co-operation of the Institute of Forests, Teheran, which is supplying planting stock and seeds, has initiated afforestation work in the arid, wind-swept plain of Mughan on the river Arak. Nearly 150,000 seedlings, including Walnut, are estimated to have been planted since work began in 1952. Other activities of the Institute of Forests include: replanting the almost destroyed Tamarisk forests of Seistan; opening nurseries in various places for local afforestation; reservation of certain forests, involving fencing with barbed wire and destruction of villagers' charcoal kilns (**7**; July–Oct. 1953).

Tanganyika. Fishing for dagaa (a small sardine-like fish) in Lake Tanganyika is carried on by some 6000 fishermen using 2000 canoes. The traditional method is to fish during moonless periods of the night by the light of flares of *Pterocarpus chrysothrix*, which burns with a bright, smokeless flame. The Fisheries Office has now persuaded the fishermen to use paraffin pressure lamps of 300–350 candle-power, which effect a great saving in costs (**2**; April 1954).

Trinidad. The attempt to establish a box-making industry, using local timbers, has proved a failure, partly because of marketing difficulties, but chiefly because of defects in the woods used—inferior colour, and susceptibility to moulds even after treatment. Box shooks made of Toporite (*Hernandia sonora*), when exported to Britain, caused dermatitis in factory employees, though never known to do so in Trinidad. More encouraging progress was made by the Trinidad Match Factory, which opened new premises in Oct. 1952. Jereton (*Didymopanax morototoni*) is the preferred species, but others are also being used in small quantities (**14**; 1954).

U.S.A. It is intended to establish a forest genetics research centre in the South, provided that the terms of the 1955 Federal Forest Service budget are approved by Congress. The site has not yet been announced. The centre will be similar in many ways to that at Placerville, Calif. The project will be supported by the Forest Farmers' Research Foundation now being organized by the Forest Farmers' Association of Atlanta, Ga. (**9**; May 1954).

Plans for establishing a forest experiment station at Oregon State College, Corvallis, Ore., to serve the State's timber industry, were approved in April by the State Board of Higher Education (**6**; June 1954).

In an experiment on 15 acres of 20- to 25-year-old Douglas Fir and minor species at North Bend, Washington, commercial fertilizers were spread by air from a Stearman spray plane in June. Growth plots have been set up in treated and in adjacent untreated areas. Preliminary results will be assessed at the end of next season. Chemicals (NH_4NO_3 and urea compound) were applied at a rate of 70 lb. nitrogen/acre (**6**; August 1954).

Successful use of a television camera of an industrial type to pick up forest fires from the top of a watch tower has been reported. The camera, which has a telephoto lens, is installed in a plexiglas dome on top of a look-out tower and is rotated continuously by a ratiomotor geared to less than half a revolution per minute. It has picked up a forest fire 20 miles away and a grazing cow 4 miles from the tower; tests for picking up fire-raisers have also been made. Azimuth markings are set in the dome for finding the bearings of forest fires. Since the camera's infinity lens would show these as blurred, a special bifocal lens that can be turned on or off independently of the camera is provided for these readings. The whole operation can be controlled from a distance (**6**; June 1954).

The 'Little Beaver' tree girdler made by the Haynes Manufacturing Company of Livingston, Texas, has a special high-speed cutting wheel that cuts at walking speed. It cuts a smooth half-round girdle sufficiently wide to kill the tree. It is powered by a light-weight, easily started Clinton engine. An attachment can be used to apply poison in the girdle as the tree is girdled. The cost of the unit is \$155·00 (**15**; 15.5.54).

An experiment in chemical barking, which may make extensive stands of scrub Oak in central Wisconsin available for pulpwood, is being conducted this summer by the Nekoosa-Edwards Paper Co. at Port Edwards. If the experiment is successful, farmers and other owners of wood-lots can treat considerable cordage by chemical methods during a short period in June and July, and the wood can then stand until the idle months of late winter when the farmer has spare time for harvesting his wood. The method employed (application of Na arsenite by brush after girdling) can be carried out only during the sap-peeling season (ca. 45 days from the beginning of June). An experienced crew (foreman, painter, and 4 girdlers) can treat 100–150 cords/day depending on the density of the stand (**11**; 18.6.54).

A power saw manufactured by Wright Power Saw and Tool Corporation, Stratford, Conn., differs from other types in having a precision guided reciprocating blade instead of a chain blade. The blade faces down and away from the operator and the saw shuts off immediately when a special trigger device is released. The blade can be changed very quickly and teeth have a permanent set (**13**; May 1954).

Sawmill operators who are felling and sawing timber on Third Army reservations are using mine detectors lent by the Army to determine whether shrapnel from firing practice is present in the logs. If metal is found it is chopped out with an axe and the rest of the timber can be sawn without risk of damaging the saws (**15**; 15.6.54).

Experiments and research in an attempt to develop a rodent-proof plywood for the construction of grain-storage facilities, have resulted in the development of a product called 'Gilwood', which incorporates a 4-mesh, 23-gauge, standard ungalvanized wire netting between the outer and the next inner ply, in the manufacture of a standard plywood. The advantages claimed for 'Gilwood' over standard plywood are that it is rodent-proof and at least twice as strong as standard plywood, has uniform distribution of stresses and strains over the entire sheet, owing to the wire-netting reinforcement, and costs less to handle and transport owing to its lightness (**18**; June 1954).